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NEW NUCLEAR DATA

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ANNOUNCEMENT

This quarterly issue of New Nuclear Data covers the period from July 1, 1954 to Sept. 30, 1954, and supplements the cumulation of New Nuclear Data published in Vol. 8, No. 12B, for the first six months of 1954. An annual cumulation of New Nuclear Data will be published in Vol. 8, No. 24B, dated Dec. 31, 1954. The annual author, subject, and availability cumulations will be published in Vol. 8, No. 24A, dated Dec. 31, 1954.

The printing of this publication has been
approved by The Director of the Bureau
of the Budget August 3, 1954

NEW NUCLEAR DATA

1. Radioactivity, Levels, Abundances, Moments
2. Neutron Cross Sections
3. Ground State Q's
4. Mass Differences and Ratios (No new data in current quarter)

INTRODUCTION

The nuclear data presented here have been compiled by the Nuclear Data Group which is sponsored by the National Research Council and supported by the Atomic Energy Commission and the National Bureau of Standards.

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This issue of Nuclear Science Abstracts contains the third quarterly list of new nuclear data. Issue 24B will contain the annual cumulation of all data in the 1954 lists.

As the current literature is surveyed, the new nuclear results are first printed on 3" × 5" cards which are collected into sets of 100 to 150 cards each month. Individuals, laboratories, or libraries may subscribe to the card sets directly by applying to the Publications Office, National Research Council, 2101 Constitution Avenue, N. W., Washington 25, D. C. The price, based on actual mechanical costs, is currently $20 per year domestic and $30 per year foreign (air mail postage included for foreign but not for domestic subscriptions).

CONVENTIONS

All energies are given in Mev and all cross sections in barns unless otherwise stated in the tabular material.

Numerals in italics following a measured value are the error (as reported by the authors) in the last figures of the values. In cases where confusion seems possible, the conventional ± is used.

Magnetic moments are reported as before without diamagnetic correction but are now based on $\mu(H) = 2.79267$ and the substandards listed by H. Walchli, ORNL-1469.

In writing reactions in Table 1, Radioactivity, Levels, Abundances, Moments, superscripts to denote the A value of the target nucleus have been used only when the target material is monoisotopic or has been isotopically enriched. "B^{10}(d,p)," for example, means that the d,p reaction was observed in a sample enriched in B^{10} while "B(d,p)" means it was observed in natural B. This policy was followed previously for "heavy" but not for "light" nuclei. It was not practical to adhere to it in Table 3, Ground State Q's. In this table, enrichment is denoted by underlining the A superscript.

Even when enriched material is not used, the nucleus under which the information is listed is often fairly certain because of some large natural abundance or cross section, or because of the particular activity produced or energy released. In such cases the nucleus in question is put down without a following "?". When there is no indication as to the isotope involved, information is listed under the element in question.

When a method of production of a radioactive nucleus has been given, the lowest bombarding energy used by the experimenter is indicated; e.g. Ag(20-Mev p). If this energy has actually been determined to be the threshold, it is underlined, e.g. Sn(14-Mev p).

The large black dots on the decay schemes are used to indicate experimentally established coincidences. α, β, or γ rays entering a level and dotted at their arrowheads have been shown to be in coincidence with gamma rays leaving the same level and dotted at their origins. In case of a simple cascade, the dots of the incoming and outgoing rays are superimposed.

Electron capture, ϵ, is shown on decay schemes by long and short dashes. Dashes of equal length are used for doubtful radiations or levels.

For the light nuclei, energy levels in the compound nucleus are tabulated rather than the resonant energy of the bombarding particle. The binding energy of the bombarding particle in the compound nucleus is taken from the table of F. Ajzenberg, T. Lauritsen, Rev. Mod. Phys. 24, 321(1952) for $Z \le 10$, or from P. M. Endt, J. C. Kluyver, Rev. Mod. Phys. 26, 95(1954) for Z from 11 to 20.

ABBREVIATIONS

a	absorption
$a\beta\gamma$	absorption of β's in coincidence with γ's
ace^-	absorption of conversion electrons
a coin	measurement by placing absorbers between counters in coincidence
α	total γ-ray conversion coefficient, N_e/N_γ
$\alpha_K, \alpha_L, \ldots$	γ-ray conversion coefficient for electrons ejected from the K, L, ... shell
$\alpha_0, \alpha_1, \ldots$	α to g.s., first excited state, ... of residual nucleus
b	coefficient in angular correlation function, $1 + b \cos^2 \theta$
B	band spectra method
$Be\gamma n$	measurement by detection of photoneutrons from Be
B_n, B_p	binding energy of a neutron, proton to a nucleus
$\beta\gamma(\theta)$	angular correlation of β's and γ's in coincidence
Calc	calculated from experimental work reported elsewhere
cc	cloud chamber
CcW	Cockcroft Walton accelerator
ce^-	conversion electrons
chem	chemical separation of product following reaction
Cpt	Compton electrons
d	(1) deuteron, (2) descendant of, (3) days, when used as superscript
$d,p(\theta)$	angular distribution of protons with respect to deuteron beam
$D\gamma n, D\gamma p$	measurement by detection of photoneutrons or photoprotons from deuterium
$\bar{E}$	average energy
E_0	resonance energy
$E_\beta, E_\gamma, \ldots$	energy of β ray, energy of γ ray, ...
E_{dis}	disintegration energy
EA	electrostatic analyzer
E1, E2, ...	electric dipole, electric quadrupole, ...
e_A	Auger electron
el	elastic scattering
ϵ	electron capture
ϵ_K, ϵ_L	electron capture from K, L shell
f	fission, in abbreviations for methods of production or detection
F-K	Fermi-Kurie β energy distribution plot
$\gamma(\theta, T)$	numbers of γ's as function of angle and temperature

$\gamma\gamma, \beta\gamma, \alpha\gamma, n\gamma$	$\gamma\gamma, \beta\gamma, \alpha\gamma$, or $n\gamma$ coincidences. (0.123 γ) (0.246 γ, 0.325 γ) means 0.123 γ in coincidence with 0.246 γ and 0.325 γ
Γ	resonance half-width (the whole width at half-maximum)
G–M	Geiger-Müller counter
g.s.	ground state
I	(1) nuclear induction magnetic resonance method; (2) spin in units $h/2\pi$. + or − signs after spin values denote even or odd parity of state in question
ic	ionization chamber
IT	isomeric transition
J	quantum state of compound nucleus in a nuclear reaction. "I" is used to denote the spin of the target nucleus, final nucleus
K/L	α_K/α_L
l	angular momentum of particle absorbed into or removed from nucleus
M	molecular or atomic beam resonance method
M1,M2, ...	magnetic dipole, magnetic quadrupole ...
mb	millibarns
Mic	microwave method
mir	measurement by total reflection of neutron beam from mirror surface
ms	mass spectrometer
μ	(1) magnetic moment in units of nuclear magnetons, (2) micron, 10^{-4} cm
μs	microseconds
osc	pile oscillator method
p	(1) proton, (2) predecessor of
p res	proton resonance. Magnetic field standardized by means of proton resonance frequency
para	paramagnetic resonance method
parentheses	parentheses are put around values which are given for identification purposes
pc	proportional counter
pe^-	photoelectrons
ppl	photoplates or emulsions
primes	primes indicate inelastically scattered particles
q	electric quadrupole moment in units of barns
quad res	quadrupole resonance method
Q	reaction energy in Mev
s	(1) spectrometer method, (2) seconds, when used as superscript
s pr	pair spectrometer
S	atomic spectra measurement
scin	scintillation counter
2 cryst scin s	2-crystal scintillation spectrometer
sl	lens spectrometer
sl ce^-	conversion electrons measured in lens spectrometer
st	strong
$s\pi$	180° spectrometer
$s\pi\sqrt{2}$	double focusing spectrometer
σ	cross section in barns
σ_0	cross section at resonance energy, E_0
σ_a	absorption cross section
σ_{el}	elastic scattering cross section
σ_{inel}	inelastic scattering cross section
σ_s	scattering cross section
t	(1) triton, H^3, (2) total cross section when used under σ in cross section list
T	(1) isotopic spin; (2) temperature
τ	half life in units indicated
τ_1, τ_2	half life of upper, lower state
$\tau_{\beta\beta}, \tau_{\epsilon\epsilon}$	half life for double β, double ϵ decay
th	thermal
VdG	Van de Graaff accelerator
w,vw	weak, very weak
%	% of disintegrations
†	relative numbers. When used in connection with γ rays, relative numbers of photons, not photons plus conversion electrons, are meant
+,−	even, odd parity when used in connection with level properties

Standard journal abbreviations are used.

1. RADIOACTIVITY, LEVELS, ABUNDANCES, MOMENTS

He^5
2 3
$\sim 10^{-21}$ s

Level Li(d,He^3) $E_d = 14.5$ s
g.s.

S.H.Levine, R.S.Bender, J.N.McGruer, W.F.Vogelsang, Phys. Rev. 95, 640A (1954).

Levels Li(n,t) $E_n = 14.1$ ppl
g.s.
2.4

D.L.Allan, Nature 174, 267 (1954).

He^6
2 4
0.83 s

Levels $\mathrm{Li}^{(7)}$(d,He^3)$\mathrm{He}^{(6)}$ $E_d = 14.5$ s
g.s. $l_p = 1$ d,$\mathrm{He}^3(\theta)$
1.71

S.H.Levine, R.S.Bender, J.N.McGruer, W.F.Vogelsang, Phys. Rev. 95, 640A (1954).

Level Li(γ,p) $E_\gamma = 17.6$
1.6 ppl
Collinearity of p and He^6 tracks suggests this level decays by γ emission

E.W.Titterton, T.A.Brinkley, Proc. Phys. Soc. 67A, 469 (1954).

Li^5
3 2

H(α,α) $E_\alpha = 3.1$ to 5.3 ppl
No levels from 0.6 to 1.06 Mev above He + H
No maxima found in energy distribution of p's scattered forward by Po α's slowed down in scattering foil

C.Ruhla, J. phys. radium 15, 451 (1954).

Li^6
3 3
stable

Levels $\mathrm{Li}^{(7)}$(d,t)$\mathrm{Li}^{(6)}$ $E_d = 14.5$ s
g.s. $l_n = 1$ d,t(θ)
2.187 $l_n = 1$

S.H.Levine, R.S.Bender, J.N.McGruer, W.F.Vogelsang, Phys. Rev. 95, 640A (1954).

Levels $\mathrm{Li}^{(7)}$(p,d)$\mathrm{Li}^{(6)}$ $E_p = 18$
g.s. $l_n = 1$ p,d(θ)
(2.19) $l_n = 1$

J.B.Reynolds, K.G.Standing, Phys. Rev. 95, 639A (1954).

Li^7
3 4
stable

Level Li(p,d) $E_p = 18$
g.s. $l_n = 1$ See Li^6

J.B.Reynolds, K.G.Standing, Phys. Rev. 95,639A (1954).

Li^7
3 4
stable

Level Li(d,He^3) $E_d = 14.5$ s
g.s. $l_p = 1$ See He^6
Li(d,t) $E_d = 14.5$ s
g.s. $l_n = 1$ See Li^6

S.H.Levine, R.S.Bender, J.N.McGruer, V.F.Vogelsang, Phys. Rev. 95, 640A (1954).

Levels Li(d,p) $E_d = 3.0$
g.s. $l_n = 1$ d,p(θ)
(0.478) $l_n = 1$

W.E.Nickell, Phys. Rev. 95, 426 (1954).

Levels Li(d,d') $E_d = 14.5$ s
g.s.
0.478
4.61
Li(d,p)
g.s.
0.478
6.56

S.H.Levine, R.S.Bender, J.N.McGruer, W.F.Vogelsang, Phys. Rev. 95, 640A (1954).

Levels Li(n,n't)He^4 $E_n = 14.1$ ppl
4.6
6 to 7
9.3 ?

D.L.Allan, Nature 174, 267 (1954).

Levels* Li^7(γ,n) βtron
9.6 14.0
10.8 17.5
12.4
*Sharp breaks in n yield curve

J.Goldemberg, L.Katz, Phys. Rev. 95, 471(1954).

Li^8
3 5
0.9 s

Li(d,p) scin
(12.5 β) (1.5 α) (θ) ~ isotropic contrary to previous report

S.S.Hanna, E.C.LaVier, C.M.Class, Phys. Rev. 95, 110 (1954).

Levels Li(d,p) $E_d = 14.5$ s
g.s.
1.0
2.28

S.H.Levine, R.S.Bender, J.N.McGruer, W.F.Vogelsang, Phys. Rev. 95, 640A (1954).

Be^7
4 3
53.6^d
Level $B^{10}(p, \alpha\gamma)$ $E_p = 1.52$
γ **0.432** scin
No other γ with $E_\gamma \leq 0.80$

R.B.Day, T.Huus, Phys. Rev. 95, 1003 (1954).

Be^8
4 4
$\sim 10^{-16}s$
$B^{10}(n,t)$ $E_n = 14.1$ scin
Reaction to g.s. not observed(< 0.3 mb/sterad)

F.L.Ribe, J.D.Seagrave, Phys. Rev. 94, 934 (1954).

Level $Be^9(p,d)Be^8$ $E_p = 18$
g.s. $l_n = 1$ p,d(θ)

J.B.Reynolds, K.G.Standing, Phys. Rev. 95, 639A (1954).

Levels $Li^7(p,\gamma)$ $E_p = 0.45$
1.8† (4.09) I = 2 α range
1.7† 5.31 I = 2 $\alpha,\gamma(\theta)$
1.0† 7.51 I = 0 or 2
†Transitions to levels per 100 γ's from 17.63 level

E.K.Inall, Phil. Mag. 45, 768 (1954); E.K.Inall, A.J.Boyle, Phil. Mag. 44, 1081 (1953).

Level Li(d,n) $E_d = 0.75$
5.4 a pc
4.9 level not found

G.C.Reid, Proc. Phys. Soc. 67A, 466 (1954).

Level Li(p,γ) $E_p = 0.45$
γ (17.6) M1,E2 $e^+e^-(\theta)$

S.Devons, G.Goldring, Proc. Phys. Soc. 67A, 413 (1954).

Level Li(p,n) $E_p = 1.9$ to 2.4
~18.9 (resonance near threshold)

H.W.Newson, J.H.Gibbons, Phys. Rev. 95, 640A (1954).

$Li^6(d,\alpha)$ $E_d = 0.06$ to 0.45
$Li^6(d,n)53.6^dBe$
No resonances n/α yield~constant

F.Hirst, I.Johnstone, M.J.Poole, Phil. Mag. 45, 762 (1954).

Be^9
4 5
stable
Level $Be^9(p,d)Be^8$ $E_p = 18$
g.s. $l_n = 1$ See Be^8

J.B.Reynolds, K.G.Standing, Phys. Rev. 95, 639A (1954).

Be^9
4 5
stable
Levels $B^{10}(n,d)Be^9$ $E_n = 14.1$ scin
8† g.s. $l_p = 1$ n,d(θ)
5† (2.43) $l_p = 1$
No 1.5 level (< 0.4†)
No other level below 5.5
†Peak cross section in mb/sterad

F.L.Ribe, J.D.Seagrave, Phys. Rev. 94, 934 (1954); 95, 649A (1954).

Level $B^{11}(d,\alpha)$ $E_d = 0.427$
2.431 6 s

R.B.Elliott, D.J.Livesey, Proc. Roy. Soc. 224A 129 (1954).

Levels $Be^9(e,e')$ $E_e = 190$
2.54* s
6.96*
*From preliminary calibration

J.A.McIntyre, B.Hahn, R.Hofstadter, Phys. Rev. 94, 1084 (1954).

Levels $Li(d,p)0.9^sLi^8$
17.30 $E_d = 0.7$ to 3.3
17.49
No 17.8 level

S.Bashkin, Phys. Rev. 95, 1012, 640A (1954).

B^9
5 4
Levels $B^{(10)}(p,d)B^{(9)}$ $E_p = 18$
g.s. $l_n = 1$ p,d(θ)
2.4 $l_n = 1$

J.B.Reynolds, K.G.Standing, Phys. Rev. 95, 639A (1954).

B^{10}
5 5
stable
Level $B^{(11)}(p,d)B^{(10)}$ $E_p = 18$
g.s. $l_n = 1$ p,d(θ)
$B^{(10)}(p,d)B^{(9)}$
g.s. $l_n = 1$ See B^9

J.B.Reynolds. K.G.Standing, Phys. Rev. 95, 639A (1954).

Level $B^{10}(p,p'\gamma)$ $E_p = 1.5$ to 2.6
γ **0.718** scin
No other γ observed

R.B.Day, T.Huus, Phys. Rev. 95, 1003 (1954).

Levels $Be^9(d,n)$ $E_d = 0.75$
0.6 2.9 ? a pc
1.8 3.5
2.2

G.C.Reid, Proc. Phys. Soc. 67A, 466 (1954).

B^{10}
5 5
stable

$Be^9(d,n)$ $E_d = 0.66$
$(0.72\ \gamma)(2.86\ \gamma,\ 1.43\ \gamma,\ 0.41\ \gamma)$
$(1.02\ \gamma)(1.43\ \gamma,\ 0.72\ \gamma,\ 0.41\ \gamma)$
$(1.43\ \gamma)(2.15\ \gamma,\ 1.43\ \gamma,\ 0.41\ \gamma)$
$\gamma\gamma(\theta)$ consistent with known spin assignments

S.M.Shafroth, S.S.Hanna, Phys. Rev. 95, 86, 641A (1954).

Levels $Li(\alpha,\gamma)$ $E_\alpha = 0.4$ to 1.4
4.75
<2†* (5.11) J = 2− T = 0
100† 5.162 8 J = 2+ T = 1
*No resonance observed
Excitation function used for spin assignments
Estimates of T admixtures given

G.A.Jones, D.H.Wilkinson, Phil. Mag. 45, 703 (1954).

Capture γ's $Be^9(p,\gamma)$ scin
6.87 level $E_p = 0.315$ J = 1
0.72 100† 5.1
1.03 40† 6.0
1.43 15† 6.7
45† 4.7
$(1.03\ \gamma)(0.72\ \gamma)(\theta)$ I = 0, 1, 3*

R.R.Carlson, E.B.Nelson, Phys. Rev. 95, 641A (1954); *verbal report.

$Be^9(p,\gamma)$ $E_p = 1.0$
γ (7.48) E1 + (E3 or M2) $e^+e^-(\theta)$

S.Devons, G.Goldring, Proc. Phys. Soc. 67A, 413 (1954).

Level $Be^9(p,\alpha\gamma)$ $E_p = 1.2$ to 2.7
(8.89) T = 1* $\Gamma = 0.041$ s
*Resonant for α's to 3.57 Li^6 level but not for α's to g.s. or 2.19 level

R.Malm, D.R.Inglis, Phys. Rev. 95, 993, 641A (1954).

B^{11}
5 6
stable

Levels $Li(\alpha,>4.5\gamma)$ $E_\alpha = 0.5$ to 2.5
9.19 $\Gamma = 4$ kev
9.29 $\Gamma = 7$ kev
No capture resonances from $E_\alpha = 0.96$ to 2.5
Levels $Li(\alpha,\alpha'\ 0.478\ \gamma)$ $E_\alpha = 1.5$ to 3.5
scin
9.88
10.24 10.39 ?
10.32 ? 10.62

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 94, 1252, 748A (1954).

B^{12}
5 7
0.03^s

Levels $B(d,p)$ $E_d = 4.15$ s
0.940
1.664

L.M.Khromchenko, Doklady Akad. Nauk SSSR 94, 1037 (1954).

C^{10}
6 4
19^s

Levels $B^{10}(p,n)$ $E_p = 17$ ppl
3.34*
~5.1*
~5.5*

F.Ajzenberg, W.Franzen, J.G.Likely, Phys. Rev. 95, 641A (1954); *verbal report.

C^{11}
6 5
20.4^m

β^+ 0.968 8 B(1.77-Mev d); sl

C.Wong, Phys. Rev. 95, 765 (1954).

Levels $B^{10}(p,\sim 9.7\ \gamma)$ $E_p = 0.5$ to 2.5
9.8
10.9 ?
No resonances at $E_p = 0.78$, 0.95, 1.33

Level $B^{10}(p,\alpha\ 0.432\ \gamma)$
10.08 scin

R.B.Day, T.Huus, Phys. Rev. 95, 1003 (1954).

C^{12}
6 6
stable

Levels $C(\alpha,\alpha'\gamma)$ $E_\alpha = 22$
(4.43) α', C recoil
7.7 α', no C recoil*
12.7 α'
*Probability of decay to $Be^8 + \alpha > 80\%$
Broad α group at small angles may be from overlapping C^{12} states from 9 to 11.7 Mev

D.W.Miller, V.K.Rasmussen, M.B.Sampson, Phys. Rev. 95, 649A (1954).

γ $C(p,p'\gamma)$ $E_p = 30$ to 340
15.2 s pr
γ also produced by $B^{11}(d)$ but not $B^{10}(d)$

D.Cohen, B.J.Moyer, H.Shaw, C.Waddell, Phys. Rev. 95, 664A (1954).

Levels* $C(\gamma,n)$ $20.4^m C^{11}$ βtron
19.3 20.5 21.6
19.8 20.7 22.4
20.1 21.1 22.8
*Sharp breaks in activation curve

L.Katz, R.N.H.Haslam, R.J.Horsley, A.G.W.Cameron, R.Montalbetti, Phys. Rev. 95, 464 (1954).

Levels* $C(\gamma,n)$ βtron
20.1 20.8 21.6
20.5 21.2 22.4
*Sharp breaks in n yield curve

J.Goldemberg, L.Katz, Phys. Rev. 95, 471 (1954).

C^{13}
6 7
stable

Levels C(d,p) d,p(θ)

σ*		l_n	σ*		l_n
0.12	3.71	1	0.14	6.91	0 or 1
0.20	3.88	2	0.08	7.23	0 or 1
0.08	4.75	0	0.08	7.39	0 or 1
0.08	5.03	0	0.13	7.58	0
0.06	5.22	0	0.12	7.75	0 or 1
0.05	5.45	0	0.13	7.88	2
0.05	5.78		0.13	8.02	1
0.12	6.21	0	0.20	8.16	0 or 1
0.11	6.36	0	0.25	8.34	
0.13	6.63	0	0.24	8.53	

*Total cross section in barns

J.Catalá, F.Senent, Anales real soc. españ fis. y quim. 50A, 55 (1954).

C^{14}
6 8
~5600^{y}

τ 5900^{y} *250* extrapolation ic

R.S.Caswell, J.M.Brabant, A.Schwebel, J. Research Nat. Bur. Standards 53, 27 (1954).

$C^{13}(d)$ $E_d = 4.0$

γ	s	6.14	w	7.11*	s pr
	w	6.48*	w	7.37*	
	s	6.72*			

*Might be in N^{14}

R.D.Bent, T.W.Bonner, R.F.Sippel, Phys. Rev. 95, 649A (1954).

N^{14}
7 7
stable

$C^{13}(d)$ $E_a = 4.0$

γ	s	4.96	w	6.48*	s pr
	s	5.12	s	6.72*	
	s	5.74	w	7.11*	
			w	7.37*	

*Might be in C^{14}

R.D.Bent, T.W.Bonner, R.F.Sippel, Phys. Rev. 95, 649A (1954).

N^{15}
7 8
stable

Levels $C^{14}(p,\gamma)$ $E_p = 0.3$ to 1.7
10.54* scin
10.70* J = 3/2− p,γ(θ)
10.80* J = 3/2−? p,γ(θ)
(11.30)** J = 1/2− p,n(θ) p,γ(θ)
*g.s. γ and ~ 5.3 γ observed **g.s. γ and n

G.A.Bartholomew, F.Brown, H.E.Gove, A.E.Litherland, E.B.Paul, Phys. Rev. 95, 595, 649A (1954).

O^{14}
8 6
72^{s}

τ 72.1^{s}
β^+ 1.835 *8* F-K plot linear sl
ft = 3275 ± 75
No 4.1 β^+(< 0.3% of 1.84 β^+, log ft > 7.3)

J.B.Gerhart, Phys. Rev. 95, 288(1954).

O^{16}
8 8
stable

γ $F^{19}(p,\alpha\gamma)$
(6.14) E3 $e^+e^-(\theta)$

S.Devons, G.Goldring, Proc. Phys. Soc. 67A, 413 (1954).

O^{16}
8 8
stable

Levels $N^{15}(p,\gamma)$ $E_p = 0.3$ to 2.0
< 1† (12.43)
100† (13.09) J = 1 p,γ(θ)

$N^{15}(p,\alpha\ 4.4\gamma)$ p,γ(θ)
13.65 J = 1^+ or 2− Γ ~ 0.15

†Relative γ yield

A.A.Kraus, Jr., Phys. Rev. 94, 975 (1954).

Levels* $O(\gamma,n)2.0^{m}O^{15}$ β tron
15.60 17.54
15.97 17.66
16.45 17.72
16.68 17.88
16.86 18.48
16.94 18.73
17.04 18.91
17.43
*Sharp breaks in activation curve

B.M.Spicer, A.S.Penfold, J.Goldemberg, Phys. Rev. 95, 629A (1954).

Levels* $O(\gamma,n)2.0^{m}O^{15}$ β tron
15.9 16.9 19.3
16.4 17.1 20.7
16.7 18.9 21.9
*Sharp breaks in activation curve

L.Katz, R.N.H.Haslam, R.J.Horsley, A.G.W.Cameron, R.Montalbetti, Phys. Rev. 95, 464 (1954).

Levels* $O(\gamma,n)$ β tron
19.1 20.7 21.9
*Sharp breaks in n yield curve

J.Goldemberg, L.Katz, Phys. Rev. 95, 471(1954).

Levels N(d,α) $E_d = 0.60, 0.73$ d,α(θ)
~21 I = 1−, 2+, 3− states found

D.Cartwright, L.L.Green, J.C.Willmott, Phil. Mag. 45, 742 (1954).

O^{17}
8 9
stable

q −0.004 Mic
Calculated from data of Geschwind et al, Phys. Rev. 85, 474 (1952).

G.R.Bird, C.H.Townes, Phys. Rev. 94, 1203 (1954).

F^{17}
9 8
66^{s}

τ 66^{s} O(2.1-Mev d)
β^+ 1.748 *6* sl
No 0.87 β^+ (< 1% of 1.748 β^+)

C.Wong, Phys. Rev. 95, 765(1954); 92, 529A (1953).

F^{18}
9 9
1.87^{h}

Level $F^{19}(p,d)F^{18}$ $E_p = 18$
g.s. $l_n = 0$ p,d(θ)

J.B.Reynolds, K.G.Standing, Phys. Rev. 95, 639A (1954).

F^{19}
9 10
stable

Level $F^{19}(p,d)F^{18}$ $E_p = 18$
g.s. $l_n = 0$ See F^{18}

J.B.Reynolds, K.G.Standing, Phys. Rev. 95, 639A (1954).

Levels $F^{19}(p,p'\gamma)$ $E_p = 0.3$ to 1.5 s
0.1139 I = 1/2 $p,p'(\theta)$ $p,\gamma(\theta)$
0.1996 I = 5/2+ $p,p'(\theta)$ $p,\gamma(\theta)$
No 0.0857 γ (< 1% of 0.200 γ) scin
See also Ne^{20}

R.W.Peterson, C.A.Barnes, W.A.Fowler, C.C.Lauritsen, Phys. Rev. 94, 1075 (1954); 94, 951A (1954).

Levels $F^{19}(p,p'\gamma)$ $E_p = 1.4$, 1.1
(0.114) $\tau = 0.1\times10^{-8}$ s recoil
(0.200) $\tau = 8\times10^{-8}$ s

J.Thirion, C.A.Barnes, C.C.Lauritsen, Phys. Rev. 94, 1076 (1954).

Levels $F^{19}(\alpha,\alpha'\gamma)$ $E_\alpha = 0.6$ to 2.8
(0.114) I = 1/2−*
(0.200) I = 5/2+*
*From agreement of observed τ_γ's and τ_γ's calculated from σ's and these spins

R.Sherr, C.W.Li, R.F.Christy, Phys. Rev. 94, 1076 (1954).

Levels $F^{19}(\alpha,\alpha'\gamma)$ $E_\alpha = 1.1$ to 2.4
γ 0.113 scin
0.196
Yield (0.196 γ)>> yield (0.113 γ)
No 0.083 γ (< 2% of 0.196 γ)

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 93, 351 (1954); 94, 748A, 1252 (1954).

Levels* $F^{19}(\gamma,n)1.87^hF$ βtron
10.6 11.9
10.9 12.2
11.2 15.3
11.5
*Sharp breaks in activation curve

J.G.V.Taylor, L.B.Robinson, R.N.H.Haslam, Can. J. Phys. 32, 238 (1954).

Levels* $F^{19}(\gamma,n)$ βtron
11.0 11.9
11.5 15.3
*Sharp breaks in n yield curve

J.Goldemberg, L.Katz, Phys. Rev. 95, 471 (1954).

F^{20}
9 11
12^s

β^- 100% 5.419 *13* F^{19}(2.3-Mev d) sl
F-K plot linear to 1 Mev
γ 1.627 sl pe^-
No 7.05 β (< 0.03%)

C.Wong, Phys. Rev. 95, 761 (1954); 92, 529A (1953).

Ne^{19}
10 9
18.5^s

β^+ branching to 0.1-0.2 F^{19} levels <~0.1%

W.P.Alford, D.R.Hamilton, Phys. Rev. 94, 779A (1954); verbal report.

Ne^{20}
10 10
stable

Levels $F^{19}(p,p'\ 0.114\ \gamma)$ $p,p(\theta)$

	J		J
(13.505)	1+	(14.157)	2−
(13.759)	1+	(14.182)	2−
(13.907)	2−	14.230	1+

$F^{19}(p,p'\ 0.200\ \gamma)$

(13.700)	2−	(14.157)	2−
(13.907)	2−	(14.182)	2−

R.W.Peterson, C.A.Barnes, W.A.Fowler, C.C.Lauritsen, Phys. Rev. 94, 1075 (1954); 94, 951A (1954).

Ne^{21}
10 11
stable

Level $Ne^{20}(d,p)$ $E_d = 0.877$
0.349 s

K.Ahnlund, Arkiv Fysik 7, 155 (1954).

Ne^{22}
10 12
stable

Level $F^{19}(\alpha,p\gamma)$ $E_\alpha = 1.3$ to 3.5
γ 1.28* scin
No 0.4 γ
*Not F^{19} 1.37 γ. Assignment from agreement with known level.

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 94, 1252 (1954).

Na^{22}
11 11
2.6^y

ϵ 9 ± 5% $\gamma\gamma/\gamma$ GM

R.Sehr, Z. Phys. 137, 523 (1954).

Level $F^{19}(\alpha,n\gamma)$ $E_\alpha = 3.1$ to 3.6
γ 0.592 $\tau < 0.01^s$ scin
Assignment from rise in n yield ~0.7 Mev above threshold

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 94, 1252 (1954).

Na^{23}
11 12
stable

q +0.10 s

P.L.Sagalyn, Phys. Rev. 94, 885 (1954).

$Na^{23}(\alpha,\alpha'\gamma)$ $E_\alpha = 1.4$ to 3.5*
γ 0.446 scin

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 95, 629A (1954); *verbal report.

Na^{23}
11 12
stable

Levels F^{19} (α,α' 0.114 γ) scin
$E_α$ = 1.0 to 3.5

12.32 12.55 12.60 12.68 12.78 12.90 13.03 13.13 13.26

F^{19} (α,α' 0.200 γ)

12.32 12.40 12.47 12.55 12.60 12.68 12.78 12.90 13.00 13.13 13.26

Levels F^{19} (α,p 1.28 γ) scin
$E_α$ = 1.3 to 3.5

11.73 11.91 12.08 12.15 12.24 12.32 12.40 12.47 12.55 12.60 12.68 12.78 12.85 12.90 13.00 13.13 13.26

F^{19} (α,n 0.59 γ) scin
$E_α$ = 3.1 to 3.5

13.13 13.26

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 94, 748A, 1252 (1954).

Mg^{23}
12 11
11^{s}

τ 10.7^{s} Mg(≤ 70-Mev γ)
β^{+} 2.95 scin

W.A.Hunt, R.M.Kline, D.J.Zaffarano, Phys. Rev. 95, 611A (1954).

Mg^{24}
12 12
stable

Capture γ's Na^{23} (p,γ) E_p = 0.305
γ 1.38 scin
4.2
6.7
7.9
10.7 b = −0.24 p,γ(θ)
(4.2 to 10.7: 3 cryst scin)

No 11.9 γ (<2% of 10.7 γ)
(1.38 γ) (10.7 γ) (7.9 γ) (4.2 γ)
(1.38 γ, > 1.4 γ) (≥ 1.4 γ) (> 1.4 γ)
Energy region between 1.5 and 3.0 not studied
No α's from 11.95 level (<20%)

R.R.Carlson, E.H.Geer, E.B.Nelson, Phys. Rev. 94, 1311 (1954); 95, 650A (1954).

Levels Na^{23} (p,γ) E_p = 1.0 to 2.5
Na^{23} (p,α) scin, pc
52 levels 12.7-14.0 Γ's given

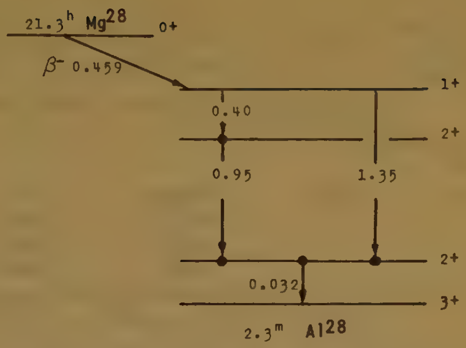
P.M.Stelson, W.M.Preston, Phys. Rev. 95, 974 (1954).

Mg^{28}
12 16
21.4^{h}

p 2.3^{m}Al Mg(39-Mev α) chem
τ 21.3^{h} Si(≤ 100-Mev γ) chem
β^{-} 0.40 a
γ 96† 0.0319 $α_K$ = 0.032 M1 scin
τ < 2x10^{-9s}
31† 0.40
29† 0.95
70† 1.35

(0.0319 γ)(0.40 γ, 0.95 γ, 1.35 γ)
(0.40 γ)(0.95 γ)
No γ with $E_γ$ > 2.0 (< 1†)
1.015 Al^{28} level not populated by 21.4^{h}Mg

Mg^{28}
12 16
21.4^{h}



R.K.Sheline, N.R.Johnson, P.R.Bell, R.C.Davis, F.K.McGowan, Phys. Rev. 94, 1642 (1954); 90, 325 (1953); 89, 520 (1953).

Al^{24}
13 11
2.1^{s}

τ 2.0^{s} Mg(< 20-Mev p)
β^{+} scin
γ 1.38 2.70 4.2 5.4 5.7 ? 7.0 scin
α/(> 1-Mev γ) ~ 0.003 scin

S.W.Breckon, A.Henrikson, W.M.Martin, J.S.Foster, Can. J. Phys. 32, 223 (1954).

Al^{25}
13 12
7.6^{s}

τ 7.62^{s} *13*

Mg^{24} (p,γ) EA

Level	E_0	Γ
2.51	0.2255 *3*	0.006
2.69	0.4184 *4*	0.0025

S.E.Hunt, W.M.Jones, J.L.W.Churchill, D.A.Hancock, Proc. Phys. Soc. 67A, 443 (1954); Phys. Rev. 89, 1283 (1953); Nature 172, 460 (1953).

β^{+} 3.2 Mg(0.25-Mev p): a
(β^{+})(1.0-to 2.5-Mev γ) ≤ (9 ± 8)%

S.E.Hunt, W.M.Jones, J.L.W.Churchill, Proc. Phys. Soc. 67A, 479 (1954).

Al^{26}
13 13
6.7^{s}

$τ_1$ 6.5^{s} *1* Al^{27} (13.4-Mev γ)
β^{+} 3.2 a

R.N.H.Haslam, W.N.Roberts, D.S.Robb, Can. J. Phys. 32, 361 (1954).

$τ_1$ 6.68^{s} *11*

Resonances Mg^{25} (p,γ) EA

E_0	Γ
0.3167 *7*	0.012
0.3915 *5*	0.008
0.4956 *6*	0.005
0.5134 *7*	0.003
0.5304 *7*	0.003

S.E.Hunt, W.M.Jones, J.L.W.Churchill. D.A.Hancock, Proc. Phys. Soc. 67A, 443 (1954); Nature 172, 460 (1953).

Al^{26}
13 13
long

Level $Al^{27}(p,d)Al^{26}$ $E_p = 18$
g.s.? $l_n = 2$ $p,d(\theta)$

J.B.Reynolds, K.G.Standing, Phys. Rev. 95, 639A (1954).

Levels $Si(d,\alpha)$ $E_d = 7$ s
g.s. 1.750
0.418 1.85 ?
1.052 2.064
Only T = 0 levels expected from this reaction
No level between g.s. and 0.42 ($<$ 3% of g.s.)

C.P.Browne, Phys. Rev. 95, 860(1954).

Resonances $Mg^{25}(p,\gamma)$ $E_p = 0.2$ to 0.7

E_o	γ's			
0.315	18†	6.28		
0.389	8†	6.20		
0.436	6†	6.28	25†	6.77*
0.508	10†	6.38		
0.586	18†	6.43		
0.620	19†	6.50		

†Relative intensity in % of γ's with $E_\gamma > 1$
β^+ yield low at 0.436 resonance
*Suggest this γ to g.s.

J.C.Kluyver, C. van der Leun, P.M.Endt, Phys. Rev. 94, 1795 (1954).

Al^{27}
13 14
stable

Level $Al^{27}(p,d)Al^{26}$ $E_p = 18$
g.s. $l_n = 2$ See Al^{26}

J.B.Reynolds, K.G.Standing, Phys. Rev. 95, 639A (1954).

Levels $Al^{27}(n,n'\gamma)$ $E_n = 0.8$ to 2.7
γ 0.85 scin
1.03
2.23
Graphs of σ's from threshold to 2.7

R.M.Kiehn, C.Goodman, Phys. Rev. 95, 989 (1954).

Levels $Mg^{26}(p,\gamma)$ $E_p = 0.3$ to 1.5
8.591
8.694
8.898
8.954
9.045
9.070
9.179
9.216
9.238
9.277
9.391
9.470
9.509
9.633
9.671

L.N.Russell, W.E.Taylor, J.N.Cooper, Phys. Rev. 95, 99 (1954).

Al^{28}
13 15
2.3^m

β^- 2.8 Al^{27}(pile n); a
γ 1.83 scin
(2.8 β) (1.83 γ) $\beta\gamma/\beta$ not f(E_β)

M.E.Nahmias, J. phys. radium 15, 568 (1954); Compt. rend. 238, 1875 (1954).

Al^{28}
13 15
2.3^m

γ 1.77 d 21.4^{h}Mg chem scin

R.K.Sheline, N.R.Johnson, P.R.Bell, R.C.Davis, F.K.McGowan, Phys. Rev. 94, 1642(1954); 90, 325 (1953).

No 2.4 γ* ($<$ 1% of 1.8 γ) $\beta\gamma$ scin
*Gentner, Maier-Leibnitz, unpublished

Th. Mayer-Kuckuk, Z. Naturf. 9A, 338(1954).

Levels $Al^{27}(d,p)$ $E_d = 4.31$ s
0.980
1.597
2.152
2.574
2.929
3.334?
3.520
3.747?
3.934
4.277
4.469
4.720
4.883
5.170
5.396
5.643?
5.784
5.968
6.148
6.298
6.438
6.641
6.855
7.013
7.197
7.599?
7.896?

L.M.Khromchenko, Doklady Akad. Nauk SSSR 94, 1037 (1954).

Resonance $Al^{27}(n)$
0.0064 $\sigma_o = 88$ $\Gamma \sim 12$ ev $l_n = 1$

R.H.Rohrer, H.W.Newson, J.H.Gibbons, P.Cap, Phys. Rev. 95, 302A (1954).

Al^{29}
13 16
6.6^m

Mg(56-Mev α) chem
β^- ~25% 1.6 a$\beta\gamma$
γ 1.31 scin
2.42
(1.6 β) (2.42 γ)

M.E.Nahmias, A.H.Wapstra, J. phys. radium 15, 570 (1954); Compt. rend. 238, 1875 (1954).

Si^{27}
14 13
4.0^s

τ 4.0^s Si($\leq$ 70-Mev γ)
β^+ 3.76 scin

W.A.Hunt, R.M.Kline, D.J.Zaffarano, Phys. Rev. 95, 611A (1954).

Si^{28}
14 14
stable

γ $Al^{27}(p,\gamma)$ $E_p = 0.660$
(10.4) E1* $D(\gamma,p)$ in ppl
*From polarization of γ-ray

I.S.Hughes, P.J.Grant, Proc. Phys. Soc. 67A, 481 (1954).

Si^{30}
14 16
stable

Levels $Al^{27}(\alpha,p)$ $E_\alpha \leq 5.3$ ppl
100† g.s.
138† 2.27
†Relative numbers the same for both 13.2 and 13.5 level of P^{31}, q.v.
$\alpha,p(\theta)$ for four proton groups given

R.R.Roy, J.Quéquin, P.Janssens, Bull. centre phys. nucléaire univ. libre Bruselles, No. 31, (1951).

P^{28}
15 13
0.28^s

τ	0.29^s		Si(15.4-Mev p)
β^+			scin
γ	1.78	5.5 ?	scin
	2.67	6.6	
	3.01 ?	7.1	
	4.3 ?	7.4 ?	
	4.6	7.7	
	4.89	8.1 ?	
	5.2 ?		

$\alpha/(>1$ Mev γ's$) < 0.001$ scin

S.W.Breckon, A.Henrikson, W.M.Martin, J.S.Foster, Can. J. Phys. 32, 223 (1954).

P^{30}
15 15
2.5^m

β^+ 3.31* P^{31}($\leq$ 70-Mev γ); scin

W.A.Hunt, R.M.Kline, D.J.Zaffarano, Phys. Rev. 95, 611A (1954); *verbal report.

Capture γ's Si^{29}(p,γ) scin

5.87 level $E_p = 0.326$

5.86

5.95 level $E_p = 0.414$

0.688
5.27

No other prominent resonances for $E_p \leq 0.700$

P.M.Endt, J.C.Kluyver, C. Van der Leun, Phys. Rev. 95, 580 (1954).

P^{31}
15 16
stable

Levels Al^{27}(α,p) $E_\alpha \leq 5.3$ ppl
13.2
13.5 See Si^{30}

R.R.Roy, J.Quéquin, F.Janssens, Bull. centre phys. nucléaire univ. libre Bruxelles, No. 31 (1951).

P^{32}
15 17
14.3^d

$e^+/e^- < 10^{-6}$ trochoidal s
No $(e^+)(e^-) < 3\text{x}10^{-5}$ per disintegration sπ*
*Path length 4.7 cm

P.Weinzierl, Z. Naturf. 9A, 69 (1954).

$e^+/e^- < 8\text{x}10^{-6}$ s*
*Path length 6 cm

G.W.McClure, Phys. Rev. 94, 1637 (1954); 91, 483A (1953).

P^{33}
15 18
24.4^d

β^- 0.251 S(th n) chem 85% P^{33};s
S(pile n) ms 70% P^{33}

B.Elbek, K.O.Nielsen, O.B.Nielsen, Phys. Rev. 95, 96 (1954).

S^{31}
16 15
2.4^s

τ 2.40^s S($\leq$ 70-Mev γ)
β^+ 4.5 scin

W.A.Hunt, R.M.Kline, D.J.Zaffarano, Phys. Rev. 95, 611A (1954).

S^{33}
16 17
stable

q −0.06 Mic

G.R.Bird, C.H.Townes, Phys. Rev. 94,1203(1954).

Cl^{32}
17 15
0.31^s

τ	0.32^s	S(14.5-Mev p)
β^+		scin
γ	2.25	scin
	3.79 ?	
	4.33	
	4.82	

$\alpha/(>1$ Mev γ's$) < 0.0005$ scin

S.W.Breckon, A.Henrikson, W.M.Martin, J.S.Foster, Can. J. Phys. 32, 223 (1954).

Cl^{34}
17 17
32.4^m

No (0.145 γ)(β^+) No (0.145 γ)(γ)

Th. Mayer-Kuckuk, Z. Naturf. 9A, 338 (1954).

Cl^{36}
17 19
4.4x10^{5y}

Capture γ's Cl(n,γ) scin
0.72
0.778
(0.778 γ)(7.77 γ) (1.15 γ)(7.42 γ)
(1.59 γ)(6.98 γ)

A.Recksiedler, B.Hamermesh, Phys. Rev. 95, 650A (1954).

Cl^{38}
17 21
1.0^s

τ_1 1.0^s Cl^{37}(pile n)
γ 0.66 scin

G.Scharff-Goldhaber, M.McKeown, Phys. Rev. 95, 613A (1954).

Cl^{38}
17 21
37.3^m

γ (1.60) $\tau < 4\text{x}10^{-10s}$
(1.60 γ)(2.15 γ)(θ) I = 3, 2, 0

J.J.Kraushaar, J.W.Mihelich, A.W.Sunyar, Phys. Rev. 95, 456(1954).

A^{37}
18 19
34^d

Double K vacancy /K capture = 3.9×10^{-4} pc
for e's with $E_e \leq 0.004$ (~73% of expected e's)

J.A.Miskel, M.L.Perlman, Phys. Rev. 94, 1683 (1954); 95, 612A (1954).

Intensity of low energy γ's in continuous γ spectrum is higher than that predicted for capture of $l = 0$ electrons. See theory which includes capture of $l = 1$ electrons [Phys. Rev. 95, 572 (1954)].

B.Saraf, Phys. Rev. 95, 612A (1954).

A^{41}
18 23
1.8^h

τ 1.80^h V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

K^{40}
19 21
1.3×10^{9y}

$\epsilon/\beta^- = 0.090$ ms
Former value of 0.060* increased by more complete A extraction

H.A.Shillbeer, R.D.Russell, R.M.Farquhar, E.A.W.Jones, Phys. Rev. 94, 1793 (1954);*91, 1223 (1953).

K^{42}
19 23
12.5^h

τ 12.5^h V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

β^-	18.2%*	1.97	F-K linear (< 15% $\Delta I = 2$, yes shape)*	sl $\beta\gamma$
	81.8%*	3.56	$\Delta I = 2$, yes shape	sl

L.Koerts, A.Schwarzschild, R.Gold, C.S.Wu, Phys. Rev. 95, 612A (1954); *verbal report.

γ	1.5†*	0.309	scin
	100†*	(1.51)	

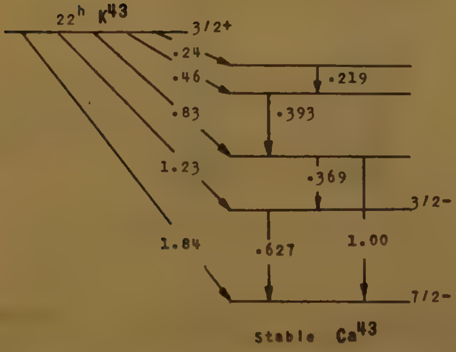
N.H.Lazar, P.R.Bell, Phys. Rev. 95, 612A (1954); *verbal report.

K^{43}
19 24
22^h

τ 22.4^h V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

τ		22.0^h	A($\sim$18-Mev α)	chem
β^-	5%	0.24		sl
	5%	0.46		
	83%	0.83		
	5%	1.22		
	2%	1.84	$\Delta I = 2$, yes shape	
γ	1†	0.219		sl pe⁻
	67†	0.369		
	6†	0.393		
	100†	0.627	$\alpha_K \sim 2\times10^{-4}$	
	4†	1.00		



T.Lindquist, A.C.G.Mitchell, Phys. Rev. 95, 444, 612A (1954).

K^{44}
19 25
22^m

τ 20^m V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

K^{45}?
19 26
34^m

τ 34^m V(187-Mev p), ms
Yield suggests element is K No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

Ca^{39}
20 19
1.0^s

τ 0.90^s Ca($\leq$70-Mev γ)
β^+ 6.1 scin

W.A.Hunt, R.M.Kline, D.J.Zaffarano, Phys. Rev. 95, 611A (1954).

Ca^{41}
20 21
1.1×10^{5y}

τ $1.1\times10^{5y*}$ 3 pc
Potassium x ray crit a
*Based on $\sigma_a(Ca^{40}) = 0.22$ and fluorescence yield = 0.13 Ca^{40}(pile n) chem

F.Brown, G.C.Hanna, L.Yaffe, Proc. Roy. Soc. 220A, 203 (1953); Phys. Rev. 84, 1243 (1951).

Ca^{43}
20 23
stable

I 7/2 S
μ -1.2

F.M.Kelley, H.Kuhn, A.Pery, Proc. Phys. Soc. 67A, 450 (1954).

Levels	Ca^{42}(d,p)	$E_d = 5$*	s
	0.38	1.00	
	0.61	1.40	

C.M.Braams, Phys. Rev. 95, 650A (1954); * verbal report.

Ca^{45}
20 25
164^d

Levels	Ca^{44}(d,p)	$E_d = 5$*	s
	0.18	2.84	
	1.43	2.96*	
	1.89	3.24*	
	2.25*	3.32*	
	2.40*	3.42*	

C.M.Braams, Phys. Rev. 95, 650A (1954); * verbal report.

Sc^{43}
21 22
4.0^h

τ 3.84^h V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

Sc^{44}
21 23
2.4^d

τ_1 2.46^d V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

Sc^{44}
21 23
4.0^h

τ_2 3.90^h V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

Sc^{47}
21 26
3.43^d

τ 3.3^d V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

Sc^{48}
21 27
1.83^d

τ 1.83^d V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

Ti

Capture γ's Ti(n,γ) scin
0.334
1.06 to 1.10 2 unresolved γ's
1.39
1.53 to 1.58 2 unresolved γ's
1.75
γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95, 636A (1954).

Ti^{45}
22 23
3.07^h

τ 3.0^h V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

Ti^{51}
22 29
5.8^m

γ 0.32 scin

Th. Mayer-Kuckuk, Z. Naturf. 9A, 338 (1954).

V

Capture γ's V(n,γ) scin
0.43
0.64
~0.82 2 unresolved γ's
γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95, 636A (1954).

V^{47}
23 24
31.1^m

τ 33^m V(187-Mev p)
Assignment confirmed with ms No chem

G.Andersson, Phil. Mag. 45, 621 (1954).

V^{48}
23 25
16.2^d

τ 16.2^d Ti(20-Mev α)

W.H.Burgus, G.A.Cowan, J.W.Hadley, W.Hess, T.Shull, M.L.Stevenson, H.F.York, Phys. Rev. 95, 750 (1954).

Cr

Capture γ's Cr(n,γ) scin
0.740 1.07
0.815 2.13
γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95, 636A (1954).

Cr^{52}
24 28
stable

Level Cr(n,n'γ) E_n = 1.4 to 2.7
1.44 scin
Graph of σ from threshold to 2.7

R.M.Kiehn, C.Goodman, Phys. Rev. 95, 989 (1954).

Cr(n,n'γ) E_n = 3.2
γ 0.75 scin
0.97
1.43
(1.43 γ)(~1.5-Mev n)
No (1.43γ)γ presumably because of low intensities of 0.75 γ and 0.97 γ
Assignment from agreement with 5.8^{d}Mn^{52} γ's

P.Shapiro, V.E.Scherrer, B.A.Allison, W.R.Faust, Phys. Rev. 95, 751 (1954).

Cr^{55}
24 31
3.5^m

τ 3.6^m Mn^{55}(15-Mev d) chem
Cr(th n)
β^- ~2.8 a

G.A.Bazorgan, J.W.Irvine, Jr., C.D.Coryell, Phys. Rev. 95, 781 (1954).

Mn^{52}
25 27
5.8^d

τ_2 5.60^d Cr(20-Mev d)

W.H.Burgus, G.A.Cowan, J.W.Hadley, W.Hess, T.Shull, M.L.Stevenson, H.F.York, Phys. Rev. 95, 750 (1954).

β^+/ϵ_K = 1.47 ± 0.08 (0.511 γ)(0.511 γ)/γ GM

R.Sehr, Z. Phys. 137, 523 (1954).

Mn^{55}
25 30
stable

Mn^{55}(p,p'γ) E_p = 0.550 to 2.40
γ 0.133 scin
See also Fe^{55}?

H.Mark, C.McClelland, C.Goodman, Phys. Rev. 95, 628A (1954).

Mn^{56}
25 31
2.58^h

Capture γ's Mn^{55}(n,γ) scin
0.098 0.266
0.206 0.308
γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95, 636A (1954).

Resonances Mn^{55}(n) E_n = 100 to 1300 ev
350 ev $\sigma_o\Gamma^2$ = 3x10^6 chopper
1120 ev

F.G.P.Seidl, D.J.Hughes, H.Palevsky, J.S.Levin, W.Y.Kato, N.G.Sjöstrand, Phys. Rev. 95, 476 (1954).

Mn^{56}
25 31
2.58^h

Resonances $Mn^{55}(n)$ $E_n = 0.2$ to 10 kev

E_o (ev)	J	Γ(ev)*	
337	2 ?	22	chopper
1800	3 ?	14	
2360	3	360	

L.M.Bollinger, R.R.Palmer, D.A.Dahlberg, Phys. Rev. 95, 645A (1954); *verbal report.

Mn^{57}
25 32
1.7^m

τ		1.7^m	Fe^{57} (fast n)	chem
β^-		2.6		scin
γ	st	0.117		scin
	st	0.134		
	w	0.220		
	w	0.350		
	w	0.690		

No 7^d activity $\sigma(7^d)/\sigma(1.7^m) < 8\times10^{-4}$

B.L.Cohen, R.A.Charpie, T.H.Handley, E.L.Olson Phys. Rev. 94, 953 (1954).

Fe

γ's Fe(n,n'γ) $E_n = 3.3$ scin

0.462	1.098	1.78
0.675	1.24	2.10
0.851	1.40	2.21
0.892	1.59	2.66
0.989	1.70	

D.L.Lafferty, L.A.Rayburn, T.M.Hahn, Phys. Rev. 95, 637A (1954).

Capture γ's Fe(n,γ) scin
0.355
1.55 to 1.68 2 unresolved γ's
γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95, 636A(1954).

Fe^{55}?
26 29

γ $Mn^{55}(p,\gamma)$ $E_p = 2.12$ scin
0.420
0.505
0.650
0.975

H.Mark, C.McClelland, C.Goodman, Phys. Rev. 95, 628A (1954).

Fe^{56}
26 30
stable

Level Fe(n,n'γ) $E_n = 0.8$ to 2.7
γ 0.85 scin
Graph of σ from threshold to 2.7

R.M.Kiehn, C.Goodman, Phys. Rev. 95,989(1954); 93, 177 (1954).

Levels Fe(n,n'γ) $E_n = 4.3$
0.85 2.7 ppl
2.1 3.0 ?

B.Jennings, J.B.Weddell, R.L.Hellens, Phys. Rev. 95, 636A (1954).

Fe^{57}
26 31
stable

$Fe^{57}(\alpha,\alpha'\gamma)$ $E_\alpha = 1.2$ to 3.2*
γ 0.014* scin
0.122

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 95, 629A (1954); *verbal report.

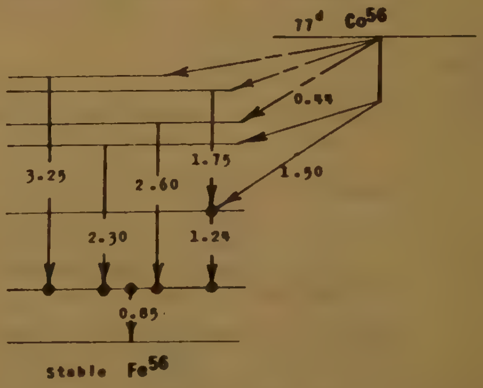
Co^{56}
27 29
77^d

τ 77.2^d Fe(20-Mev d)

W.H.Burgus, G.A.Cowan, J.W.Hadley, W.Hess, T.Shull, M.L.Stevenson, H.F.York, Phys. Rev. 95, 750 (1954).

β^+	4†*	0.44		sl
	96†*	1.50	Fe^{56} (10-Mev p)	chem
γ	100†	0.85		scin, sl pe^-
	55†	1.24		
	24†	1.75		
	12†	2.30		
	14†	2.60		
	24†	3.25		

(0.511 γ)(0.85 γ, 1.24 γ) (1.24 γ)(1.75 γ)
(0.85 γ)(1.24 γ, 1.75 γ, 2.30 γ, 2.60 γ, 3.25 γ)
No (1.24 γ)(2.30 γ, 2.60 γ, 3.25 γ)
No (0.511 γ)(3.25 γ)
*Percent of all β^+



M.Sakai, J.L.Dick, W.S.Anderson, J.D.Kurbatov, Phys. Rev. 95, 101 (1954); 94, 779A (1954).

γ 0.846 sl pe^-

P.Macq, Ann. Soc. Sci. Bruxelles,67, 309 (1954).

Co^{57}
27 30
270^d

			α_K	K/LM	
γ	15†	0.123	0.011	~8	(M)1
	1†	0.138	0.14	~8	(E)2

Fe(d) chem sm/2

D.E.Alburger, M.A.Grace, Proc. Phys. Soc. 67A, 280 (1954).

Co^{60}
27 33
5.2^y

γγ(θ) I = 4, 2, 0 b = 0.16

T.Wiedling, Arkiv Fysik 7, 69 (1954).

Co^{60}
27 33
5.2^{y}

Capture γ's $Co^{59}(n,\gamma)$ scin
0.237 0.82
0.289 1.48
0.65 1.82
γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95, 636A (1954).

Resonance $Co^{59}(n)$ $E_n = 100$ to 180 ev
134 ev $\sigma_o \sim 9700$ chopper
$\Gamma = 5.2$ $J = 3$

F.G.P.Seidl, D.J.Hughes, H.Palevsky, J.S.Levin, W.Y.Kato, N.G.Sjöstrand, Phys. Rev. 95, 476; 93, 931A (1954).

$Ni^{58?}$
28 30
stable

Level $Ni(n,n'\gamma)$ $E_n = 1.3$ to 2.7
γ 1.47 scin
Graph of σ from threshold to 2.7

R.M.Kiehn, C.Goodman, Phys. Rev. 95, 989(1954).

Ni^{59}
28 31
7.5×10^{4y}

Levels $Ni(d,p)$ $E_d = 3.0$ ppl
g.s. $I = 3/2-$ $d,p(\theta)$
1.7 ?* $I = 1/2-$
*Or 1.3 Ni^{61} level

W.W.Pratt, Phys. Rev. 94, 1086 (1954).

Ni^{60}
28 32
stable

Level $Ni(n,n'\gamma)$ $E_n = 1.3$ to 2.7
γ 1.33 scin
Graph of σ from threshold to 2.7

R.M.Kiehn, C.Goodman, Phys. Rev. 95,989(1954).

Ni^{61}
28 33
stable

Levels $Ni(d,p)$ $E_d = 3.0$ ppl
(0.66) $I = 7/2-$ $d,p(\theta)$
1.3 ?* $I = 1/2-$
*Or 1.7 Ni^{59} level

W.W.Pratt, Phys. Rev. 94, 1086 (1954).

Cu

Capture γ's $Cu(n,\gamma)$ scin
0.202
0.280
γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95,636A(1954).

$Cu(n,n'\gamma)$ $E_n = 2.8$
γ 1.67 ? scin
2.42 ?

L.A.Rayburn, D.L.Lafferty, T.M.Hahn, Phys. Rev. 94, 1641 (1954); 95, 637A (1954).

$Cu(n,n'\gamma)$ $E_n = 3.3$
γ 2.19 $n'\gamma$ scin

R.E.Garrett, F.L.Hereford, B.W.Sloope, Phys. Rev. 92, 1507 (1953); 91, 441A (1953).

Cu^{63}
29 34
stable

Levels $Cu(n,n'\gamma)$ $E_n = 2.8$
γ 0.96 scin
1.91
2.58 ?
Assignment from agreement with $38^{m}Zn^{63}$ γ's

L.A.Rayburn, D.L.Lafferty, T.M.Hahn, Phys. Rev. 94, 1641 (1954); 95, 637A (1954).

Level $Cu(n,n'\gamma)$ $E_n = 3.3$
γ 0.9 ? $n'\gamma$ scin
Assignment from agreement with $38^{m}Zn^{63}$ γ

R.E.Garrett, F.L.Hereford, B.W.Sloope, Phys. Rev. 92, 1507 (1953); 91, 441A (1953).

Cu^{65}
29 36
stable

Level $Cu(n,n'\gamma)$ $E_n = 2.8$
γ 1.11 scin
Assignment from agreement with $2.56^{h}Ni^{65}$ γ

L.A.Rayburn, D.L.Lafferty, T.M.Hahn, Phys. Rev. 94, 1641 (1954); 95, 637A (1954).

Levels $Cu(n,n'\gamma)$ $E_n = 3.3$
γ 1.13 $n'\gamma$ scin
1.53
Assignment from agreement with $2.56^{h}Ni^{65}$ γ's

R.E.Garrett, F.L.Hereford, B.W.Sloope, Phys. Rev. 92, 1507 (1953); 91, 441A (1953).

Zn^{65}
30 35
245^{d}

β^+ 2.0% (0.325) $(0.511\ \gamma)/(1.11\ \gamma)$ GM
γ 47.5% (1.11) $x\ \gamma/x$
ϵ_{gs} 50.5%

R.Sehr, Z. Phys. 137, 523 (1954).

Resonances $Zn^{64}(n)$ $E_n = 0.15$ to 10 kev chopper

E_o (ev)	Γ (ev)*	σ_o*
2750	75	945
4600	~60	565

D.A.Dahlberg, L.M.Bollinger, Phys. Rev. 95, 645A (1954); *verbal report.

Zn^{67}
30 37
stable

$Zn^{66}(n)$ $E_n = 0.15$ to 10 kev
No resonances observed

D.A.Dahlberg, L.M.Bollinger, Phys. Rev. 95, 645A (1954).

Zn^{68}
30 38
stable

Resonances $Zn^{67}(n)$ $E_n = 0.15$ to 10 kev chopper

E_o (ev)	Γ (ev)*	σ_o*
225	1.5	4350
455	13	2860
1620	~20	804
2300	~30	565

D.A.Dahlberg, L.M.Bollinger, Phys. Rev. 95, 645A (1954); *verbal report.

Zn^{69}
30 39
52^{m}

Resonance Zn^{68}(n) $E_n = 0.15$ to 10 kev
530 ev $\Gamma = 10$ ev chopper
$\sigma_o = 4910^*$

D.A.Dahlberg, L.M.Bollinger, Phys. Rev. 95, 645A (1954); *verbal report.

Zn^{71}
30 41
3^{h}

τ_1 3^{h} Zn^{70}(pile n)
β^- 1.5 $a\beta\gamma$
γ_1 0.38
γ_2 0.49
γ_3 0.61
(1.5 β) (0.38 γ, 0.49 γ, 0.61 γ)
(0.38 γ) (0.49 γ, 0.61 γ), (0.49 γ) (0.61 γ)

J.M.LeBlanc, J.M.Cork, S.B.Burson, Phys. Rev. 94, 1436A (1954).

Zn^{71}
30 41
2.2^{m}

τ_2 2.2^{m} Zn^{70}(pile n)
β^- 2.4 a
γ W 0.12 scin
0.51
W 0.90
W 1.05
(2.4 β) (0.51 γ)
No (0.51 γ) (0.12 γ)

J.M.LeBlanc, J.M.Cork, S .B.Burson, Phys. Rev. 94, 1436A (1954).

Ga^{70}
31 39
21.4^{m}

τ 21.37^{m} Ga^{69}(th n)
β^- 0.3% ~0.4 scin$\beta\gamma$
0.5% ~0.6
γ 0.174 scin
1.036
(0.174 γ)(1.04 γ)(θ) I = 0, 2, 0
No 1.21 γ (< 2% of 0.174 γ)
(~0.4 β)(0.174 γ) (~0.6 β)(1.04 γ)

M.E.Bunker, J.W.Starner, J.P.Mize, Phys. Rev. 95, 612A (1954); verbal report.

Ge^{71}
32 39
11.4^{d}

Intensity of low energy γ's in continuous γ spectrum is higher than that predicted for capture of $l = 0$ electrons. See theory which includes capture of $l = 1$ electrons [Phys. Rev. 95, 572 (1954)].

B.Saraf, Phys. Rev. 95, 97, 612A (1954).

Ge^{75}
32 43
49^{s}

τ_1 49^{s} Ge^{74}(pile n)
γ 0.139 K/L > 3 s ce^-, scin
No β^-

S.B.Burson, W.C.Jordan, J.M.LeBlanc, Phys. Rev. 95, 613A (1954).

Ge^{77}
32 45
52^{s}

τ_1 52^{s} Ge^{76}(pile n)
β^- 2.7 a
γ ~100† 0.159 scin
~100† 0.215
(2.7 β) (0.215 γ) no $\gamma\gamma$ no β(0.159 γ)

S.B.Burson, W.C.Jordan, J.M.LeBlanc, Phys. Rev. 95, 613A (1954).

Ge^{77}
32 45
12^{h}

(0.210 γ) (0.265 γ) (0.215 γ) (0.410 γ)

S.B.Burson, W.C.Jordan, J.M.LeBlanc, Phys. Rev. 95, 613A (1954); verbal report.

Se^{79}
34 45
$6.5x10^{4}y$

q +0.9 Mic
Calculated from data of Hardy et al., Phys. Rev. 85, 494 (1952).

G.R.Bird, C.H.Townes, Phys. Rev. 94, 1203 (1954).

Br^{77}
35 42
58^{h}

β^+/ϵ_K(g.s.) = 0.025
ϵ_K(g.s.)/ϵ_K(total) = 0.38 $x\gamma/x$ GM
No $\beta^+\gamma$

R.Sehr, Z. Phys. 137, 523 (1954).

Br^{79}
35 44
stable

$\mu(Br^{81})/\mu(Br^{79}) = 1.07794$ M
q +0.33
$q(Br^{79})/q(Br^{81}) = 1.19707$

J.G.King, V.Jaccarino, Phys. Rev. 94, 1610 (1954); 91, 209A (1953).

$Br^{80?}$
35 45
5.1^{s}

τ_1 5.1^{s}. Br^{79}(pile n)
γ 0.21 scin

G.Scharff-Goldhaber, M.McKeown, Phys. Rev. 95, 613A (1954); *verbal report.

Br^{80}
35 45
18.5^{m}

β^- ~15† 1.38 Br^{79}(pile n); sl $\beta\gamma$
~85† 2.0 sl
(1.38 β) (0.62 γ)

J.Laberrigue-Frolow, N.Marty, J. phys. radium 15, 584 (1954).

Br^{81}
35 46
stable

q +0.28 M

J.G.King, V.Jaccarino, Phys. Rev. 94, 1610 (1954); 91, 209A (1953).

Kr^{85}
36 49
4.4^{h}

γ (0.150) $a_K = 0.040$ sl
(0.305) $a_K = 0.41$ M4
(ce_K^- 0.305 γ)/(ce_K^- 0.150 γ) = 1.8 sl
(0.150 γ)/(0.305 γ) = 5.7 scin

I.Bergström, S.Thulin, A.H.Wapstra, B.Aström, Arkiv Fysik 7, 255 (1954).

Rb^{86}
37 49
19.5^d

β^- 0.72 sl
1.760 $\Delta I = 2$, yes shape
γ 1.055 $\tau < 10^{-9}$* sl pe$^-$
$\beta\gamma(\theta)$ b = 0.14

P.Macq, Ann. Soc. Sci. Bruxelles 67,309(1954).

Resonance Rb(pile n)19.5^dRb
~970 ev B absorption

H.W.Newson, R.H.Rohrer, Phys. Rev. 94, 654 (1954); 87, 177A (1952).

Rb^{87}
37 50
6.2×10^{10y}

τ $6.1\times10^{10y*}$
β^- 0.25 a
Excess of e$^-$ ($E_{e^-} \leq 0.012$) assumed to be β's
No γ with $E_\gamma \geq 0.1$ a
No K x ray, L x ray No βe^-
*Based on 27.5% abundance

J.Flinta, S.Eklund, Arkiv Fysik 7,401(1954).

Rb^{88}
37 51
17.8^m

Resonance Rb(pile n)17.8^mRb
~420 ev B absorption

H.W.Newson, R.H.Rohrer, Phys. Rev. 94,654(1954)

Y^{90}
39 51
64.6^h

Resonance Y^{89}(pile n)64.6^hY
~5 kev B absorption

H.W.Newson, R.H.Rohrer, Phys. Rev. 94,654 (1954).

Y^{91}
39 52
57^d

β^- 0.33 $\beta\gamma$ scin
γ 0.3% 1.22 scin
No 0.2 γ (< 0.015%)
(0.33 β)(1.22 γ) No $\gamma\gamma$ U(n,f) chem
1.22 γ follows a 59^d half-life

W.E.Bunker, J.P.Mize, J.W.Starner, Phys. Rev. 94, 1694 (1954).

Nb^{89}
41 48
0.8^h

τ_1 0.8^h Nb^{93}(50-Mev p)
p 4.3^mZr chem Zr(40-Mev p) chem

R.M.Diamond, Phys. Rev. 95, 410 (1954).

Nb^{89}
41 48
1.9^h

τ_2 1.9^h Nb^{93}(50-Mev p)
Zr(40-Mev p) chem
β^+ 2.9 a
p 79^hZr chem

R.M.Diamond, Phys. Rev. 95, 410 (1954).

Nb^{94}
41 53
2.7×10^{4y}

τ_2 2.7×10^{4y} Nb^{93}(pile n) chem
β^- 0.61 a

M.A.Roiller, E.Saeland, Phys. Rev. 94, 1079 (1954).

Tc^{93}
43 50
2.7^h

$\beta^+/\epsilon_K = 1.14 \pm 0.01$ GM
$\beta^+\gamma/\beta^+$ not f (E_β)
All ϵ_K and β^+ to one level $\beta^+\gamma/\beta^+ = x\gamma/x$

R.Sehr, Z. Phys. 137, 523 (1954).

Tc^{97}
43 54
91^d

τ_1 91^d Mo^{97}(19-Mev d) chem
γ 0.095 K/LM = 1.7 sl ce$^-$
Tc K x rays crit a

G.Boyd, Phys. Rev. 95, 113 (1954).

Tc^{97}
43 54
$\sim10^{5y}$

τ_2 10^4-10^{5y} Mo^{97}(19-Mev d) chem
Mo K x rays pc

G.Boyd, Phys. Rev. 95, 113 (1954).

Rh^{102}
45 57
210^d

β^+	4†	0.40	Ag(420-Mev p)chem;	sl
	21†	0.76		
	59†	1.24		
β^-	100†	1.15	F-K plot linear	
γ	> 92*	0.086	K/LM > 2.5	sl ce$^-$
	32*	0.124	K/LM ~ 7.5	
	10*	0.195		
	1.5*	0.353		
	3*	0.475		

*Conversion electrons per 100 β^-

L.Marquez, Phys. Rev. 95, 67 (1954).

Rh^{103}
45 58
stable

Levels $Rh^{103}(\alpha,\alpha'\gamma)$ $E_\alpha = 6.0$
γ 0.295 scin
0.357

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 95, 861; 93, 351 (1954).

Rh^{104}
45 59
44^s

Resonance Rh^{103}(n) cryst s
(1.26) ev $\sigma_0 = \sim4850 \pm 200$*
$\Gamma = 0.156$
*Including Doppler correction found from $\sigma(E_n = 1.26$ ev) as f(T)

H.H.Landon, Phys. Rev. 94, 1215; 93, 931A (1954).

Pd^{109}
46 63
13.6^h

β^- 1.020 Pd(th n); sl

J.Moreau, J. Phys. radium 15, 380 (1954).

Ag^{103}
47 56
1.1^h

τ 1.1^h Pd(12-Mev d) chem
γ 0.554 K/LM ~ 5 $\pi\sqrt{2}$ ce$^-$
0.764

W.L.Bendel, F.J.Shore, H.N.Brown, R.A.Becker, Phys. Rev. 90, 888 (1953).

τ 1.1^h Ag(80-Mev p) chem
p 17^dPd chem
β^+ 1.3 a

B.C.Haldar, E.O.Wiig, Phys. Rev. 94,1713(1954).

Ag^{107}
47 60
stable

Levels $\mathrm{Ag}^{107}(\alpha,\alpha'\gamma)$ $E_\alpha = 6.0$
γ 0.318 scin
0.413

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 95, 861 (1954).

Ag^{108}
47 61
2.3^m

Resonances $\mathrm{Ag}^{107}(n)$ $E_n = 2$ to 100 ev chopper

E_o (ev)	$\sigma_o\Gamma^2$
16.6	60
42.4	50
45.6	8
52.2	140

F.G.P.Seidl, D.J.Hughes, H.Palevsky, J.S.Levin, W.Y.Kato, N.G.Sjöstrand, Phys. Rev. 95, 476 (1954).

Ag^{109}
47 62
40^s

γ 0.0875 $\alpha_K = 9.5$ E3 d 470^dCd
K/LM = 0.80 scin, slce$^-$
(K x ray)/(0.087 γ) = 34 scin

A.H.Wapstra, Arkiv Fysik 7, 265 (1954).

γ 0.0877 $\alpha_K \sim 6.4$ E3 d 13^hPd
K/LM = 0.84 sl ce$^-$

J.Moreau, J. Phys. radium 15, 380 (1954).

Ag^{109}
47 62
stable

Levels $\mathrm{Ag}^{109}(\alpha,\alpha'\gamma)$ $E_\alpha = 6.0$
γ 0.305 scin
0.400

N.P.Heydenburg, G.M.Temmer, Phys. Rev. 95, 861 (1954).

Ag^{110}
47 63
24^s

τ_2 24^s Ag(pile n)
β^- 2.16 scin
2.84
γ 0.66 scin
w 0.72
w 0.81
w 0.88
0.84
$\beta/\gamma = 2$* scin

F.I.Boley, Phys. Rev. 94, 1078 (1954); *priv. comm.

Resonances $\mathrm{Ag}^{109}(n)$ $E_n = 2$ to 100 ev chopper

E_o (ev)	σ_o	Γ
5.22	27,000	0.168

	$\sigma_o\Gamma^2$
31.1	52
40.8	30
56.8	100
73	150
89	20

F.G.P.Seidl, D.J.Hughes, H.Palevsky, J.S.Levin, W.Y.Kato, N.G.Sjöstrand, Phys. Rev. 95, 476 (1954).

Cd^{109}
48 61
470^d

(L x ray)/(K x ray) = 0.0505 pc
(K x ray)/(0.085 γ) $\sim$ 18 scin
$E_\epsilon = 0.067$ from $\epsilon_L/\epsilon_K = 0.32 \pm 0.04$
$E_{dis} = 0.067 + 0.087$ (E_γ)

G.Bertolini, A.Bisi, E.Lazzarini, L.Zappa, Nuovo Cim. 11, 539 (1954).

In^{114}
49 65
72^s

(0.556 γ) (0.722 γ) Σ scin
No (1.30 γ) (0.556 γ)

D.C.Lu, W.H.Kelly, Phys. Rev. 95, 121 (1954).

In^{115}
49 66
6×10^{14y}

Magnetic octupole interaction observed M
Interaction constant = 0.000497 ± 33 Mc/sec

P.Kusch, T.G.Eck, Phys. Rev. 94, 1799 (1954).

In^{116}
49 67
13^s

β^- 3.29 In(pile n) scin
No γ

F.I.Boley, Phys. Rev. 94, 1078 (1954).

Sb^{124}
51 73
60^d

γ scin

100†	0.603
5.4†	0.99
6.2†	1.38
46†	1.71
10†	2.11

N.H.Lazar, Phys. Rev. 95, 292 (1954).

Sb^{125}
51 74
$\sim 2.7^y$

β^- s

29%	0.12
45%	0.300
12%	0.444
14%	0.612

$\Delta I = 2$, yes shape
(0.12 β) ($\sim$ 0.62 γ) (0.44 β) (0.175 γ)
(0.30 β) ($\sim$ 0.45 γ) (0.175 γ) ($\sim$ 0.45 γ)
No (0.61 β) (γ)

J.Moreau, Arkiv Fysik 7, 391 (1954).

(K x ray) (0.425 γ, 0.601 γ) 4πscin
No (0.176 γ) (K x ray, γ)

D.C.Lu, W.H.Kelly, M.L.Wiedenbeck, Phys. Rev. 95, 121 (1954).

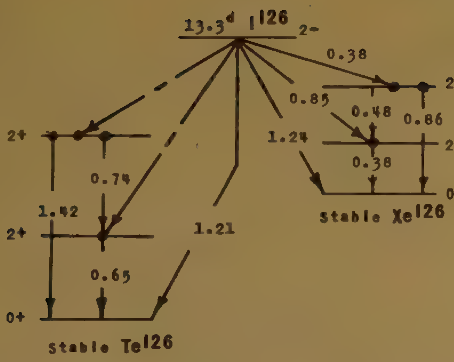
I^{126}
53 73
13.3^d

τ 13.3^d I^{127}(26-Mev n) chem
β^+ 1.19 scin β(0.511 γ)
γ scin

320†	0.382	37†	0.74
31†	0.48	5.9†	0.86
310†	0.65	3.5†	1.42

[x ray] [0.74 γ, 1.42 γ, ce$^-$(0.38 γ), 0.85 β]
β(0.38 γ, $\sim$0.5 γ) (0.38 γ) (0.48 γ, 0.85 β)
(0.65 γ) (x ray, 0.74 γ) (0.38 β) (0.86 γ)
No (x ray) (0.38 γ, 0.86 γ, 0.04 to 0.160 ce$^-$)
No γ (0.86 γ, 1.42 γ) No β(0.65 γ, 0.74 γ)
No ($>$ 0.96 β) ($\gtrless$ 0.511 γ)

I^{126}
53 73
13.3^d



M.L.Perlman, J.Welker, Phys. Rev. 95, 133, 613A (1954).

I^{127}
53 74
stable

q -0.75 S

K.Murakawa, S.Suwa, Z. Phys. 137,575(1954).

Magnetic octupole moment = +0.3 μ_o barns M
Interaction constant = 0.00245 ± 37 Mc/sec

V.Jaccarino, J.G.King, R.A.Satten, H.H.Stroke, Phys. Rev. 94, 1798 (1953).

I^{128}
53 75
25.0^m

Capture γ $I^{127}(n,\gamma)$ scin
0.255
γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95, 636A(1954).

Resonances $I^{127}(n)$ E_n = 15 to 100 ev chopper

E_o (ev)	$\sigma_o\Gamma^2$
20.5	10
31.4	100
37.7	180
46	80
66	~5
78	~60
91	~50

F.G.P.Seidl, D.J.Hughes H.Palevsky, J.S. Levin, W.Y.Kato, N.G.Sjöstrand, Phys. Rev. 95, 476 (1954).

I^{129}
53 76
1.7×10^{7y}

β^- 0.150 $\Delta I = 2$, no sl
γ 0.038 $\alpha_K = 22$ pc
K/L~10 sl ce^-
No 0.188 β(< 1%) 4π scin

E. der Mateosian, C.S.Wu, Phys. Rev. 95, 458 (1954); 91, 497A (1953).

I^{131}
53 78
8.05^d

γ (0.080) Te(pile n) chem
K/L = 6.8 L/MN = 4.8
K/LM = 5.7

G.J.Nijgh, L.Th.M.Ornstein, N.Grobben, Physica 20, 243 (1954).

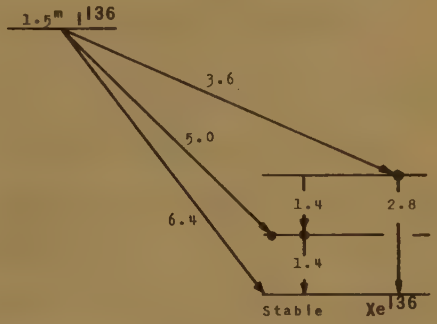
I^{134}
53 81
53^m

β^- 1.5 d 44^mTe chem; $\beta\gamma$ scin
2.5
γ 0.120 ? scin
0.200 ?
0.86
1.10
1.78
(2.5 β)(0.86 γ) (1.5 β)(1.10 γ, 1.78 γ?)

M.McKeown, S.Katcoff, Phys. Rev. 94,965(1954).

I^{136}
53 83
1.5^m

β^- 3.7 U(n,f)chem; $\beta\gamma$ scin
5.0
6.3 scin
γ s 1.38 scin
2.9
(5.0 β)(1.4 γ) (3.7 β)(2.9 γ)
(1.4 γ)(1.4 γ) No (6.3 β)(γ)



M.McKeown, S.Katcoff, Phys. Rev. 94, 965 (1954).

Xe^{125}
54 71
55^s

τ_1 55^s d 45^mCs(~0.1%) recoil
γ IT? 0.075* scin
0.110
*Possibly Pb fluorescent radiation

H.B.Mathur, E.K.Hyde, Phys. Rev. 95, 708(1954).

Xe^{125}
54 71
18^h

d 45^mCs recoil
γ 0.056 scin
0.187
0.243
(0.460)
(0.056 γ)(0.187 γ) No 0.511 γ
No (0.243 γ)(0.056 γ, 0.187 γ)
0.056 γ preceeds 0.187 γ $\gamma\gamma/\gamma$

H.B.Mathur, E.K.Hyde, Phys. Rev. 95,708(1954).

Xe^{127}
54 73
75^s

d 6.3^hCs(0.01%) recoil
γ 0.125 Cf Cs^{127} scin
IT 0.175

H.B.Mathur, E.K.Hyde, Phys. Rev. 95,708(1954).

Xe^{129} Xe(pile n) ms
54 75
8.0^{d} γ 0.0400 K/LM = 4.3 sl ce^{-}
0.196 K/LM = 2.1
(ce$^{-}_{LM}$ 0.040 γ)/(ce$^{-}_{K}$ 0.196 γ) = 0.27

S.Thulin, Arkiv. Fysik 7, 269 (1954).

γ (0.196) $\alpha_K = 11$ scin

I.Bergström, S.Thulin, A.H.Wapstra, B.Aström, Arkiv Fysik 7, 255 (1954).

Xe^{131} γ (0.164) $\alpha_K = 29$ x/γ scin
54 77
12.0^{d}

I.Bergström, S.Thulin, A.H.Wapstra, B.Aström, Arkiv Fysik 7, 255 (1954).

Xe^{133} γ (0.232) $\alpha_K = 4.4$ scin
54 79
2.3^{d} From α_K (0.232 γ) = 3 α_K (0.081 γ) sl, scin

I.Bergström, S.Thulin, A.H.Wapstra, B.Aström, Arkiv. Fysik 7, 255 (1954).

Xe^{133} γ (0.081) $\alpha_K = 1.47$ x/γ scin
54 79
5.27^{d}

I.Bergström, S.Thulin, A.H.Wapstra, B.Aström, Arkiv Fysik 7, 255 (1954).

Cs^{123} τ 6^{m} I^{127}(130-Mev α) chem
55 68 D 1.8^{h}Xe recoil
6^{m} β^{+} 0.511 γ detected, scin

H.B.Mathur, E.K.Hyde, Phys. Rev. 95,708(1954).

Cs^{125} τ 45^{m} I^{127}(100-Mev α)chems, ms
55 70
45^{m} β^{+} 2.05 sπ√2
γ 0.112 K/LM ~ 3.6 sl ce^{-}
(0.112 γ) (K x ray, 0.511 γ)
D 55^{s}Xe ~ 0.1% D 18^{h}Xe 100% recoil

H.B.Mathur, E.K.Hyde, Phys. Rev. 95,708(1954).

Cs^{127} τ 6.3^{h} I^{127}(60-Mev α)chem, ms
55 72
6.3^{h} β^{+} 0.68 sl
1.06
γ 10† 0.125 K/LM = 7.9 sπ√2 ce^{-}
w 0.169 ?
w 0.196 ?
w 0.285 ?
w 0.363 ?
80† 0.406 K/LM = 6.3
vw 0.440 $\gamma\gamma$ scin

H.B.Mathur, E.K.Hyde, Phys. Rev. 95,708(1954).

(x ray) (0.125 γ, 0.406 γ, 0.440 γ)
(0.511 γ) (0.125 γ, 0.406 γ)
(0.125 γ) (0.440 γ)
No (0.125 γ) (0.406 γ)
$\epsilon_K/\beta^{+} > 15$ scin
D 75^{s}Xe ~ 0.01% recoil

H.B.Mathur, E.K.Hyde, Phys. Rev. 95,708(1954).

Cs^{134} I 8 M
55 79 |μ| 1.10
3.15^{h}

L.S.Goodman, S.Wexler, Phys. Rev. 95,570(1954).

V.W.Cohen, D.A.Gilbert, Phys. Rev. 95, 569 (1954).

γ 0.0105 $\alpha \sim 200$ M1 pc
$\tau \lesssim 10^{-7}$s
0.1271 $\alpha_K = 2.6$ E3 sπ ce^{-}
0.8% 0.1374 K/L ~ 2 M4
(0.0105 γ) (0.1271 γ)
(0.0105 γ)/ (K x ray) ~ 0.02 pc

A.W.Sunyar, J.W.Mihelich, M.Goldhaber, Phys. Rev. 95, 570 (1954).

Cs^{137} β^{-} 0.526 ΔI = 2, yes shape sl
55 82
33^{y}

P.Macq, Ann. Soc. Sci. Bruxelles 67,309(1954).

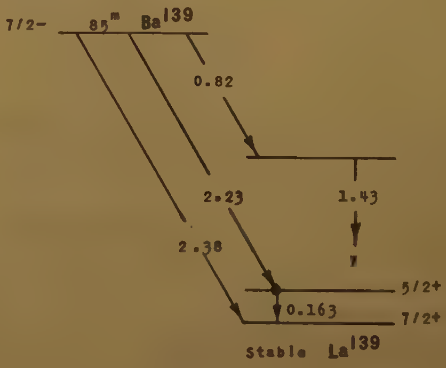
Ba^{137} d 33^{y}Cs
56 81 γ 0.662 $\alpha_K = 0.092$ M4 sπ√2 ce^{-}
2.60^{m} K : L : MN = 58 : 10 : 2.2

A.H.Wapstra, Arkiv. Fysik 7, 275 (1954).

γ 0.6626 9 ce$^{-}_{K}$ EA

S.K.Bhattacherjee, B.Waldman, W.C.Miller, Phys. Rev. 95, 404 (1954).

Ba^{139} β^{-} 19% 0.82 Ba(12-Mev d)chem; sl
56 83 66% 2.23
85^{m} 15% 2.38
γ 0.163 $\alpha_K = 0.22$ M1 sl ce^{-}
K/LM = 7.0
1.43 sl pe^{-}
(2.23 β) (0.163 γ)



A.C.G.Mitchell, E.Hebb, Phys. Rev. 95, 727 (1954).

γ 100† 0.165 $\alpha_K = 0.20$ scin
No 0.056 γ (< 0.2†) Ba(d)
No 0.275 γ (< 1†)

R.H.Nussbaum, R. van Lieshout, Physica 20, 440 (1954).

La^{139}
57 82
stable

q +0.9 S

K.Murakawa, J. Phys. Soc. Japan 9, 391(1954); Phys. Rev. 92, 325 (1953).

La^{140}
57 83
40.2^h

Resonance La(pile n)40.2^hLa
76 ev B absorption

H.W.Newson, R.H.Rohrer, Phys. Rev. 94, 654 (1954); 87, 177A (1952).

Pr^{142}
59 83
19.2^h

Resonance Pr^{141}(pile n)19.2^hPr
~380 ev B absorption

H.W.Newson, R.H.Rohrer, Phys. Rev. 94, 654 (1954).

Nd

Nd$(\alpha,\alpha'\gamma)$ $E_\alpha = 3.4$
γ 0.070 scin
0.128
0.290

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399; 93, 906 (1954).

Sm

Sm$(\alpha,\alpha'\gamma)$ $E_\alpha = 3.4$
γ 0.082 scin
0.122
0.186

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399; 93, 906 (1954).

Sm^{150}
62 88
stable

Resonance (ev) Sm(n) $E_n = 0.07$
(0.096) J = 4*
*From polarization of neutron beam transmitted by aligned Sm

L.D.Roberts, S.Bernstein, J.W.T.Dabbs, C.P.Stanford, Phys. Rev. 95, 105 (1954).

Eu

Eu$(\alpha,\alpha'\gamma)$ $E_\alpha = 3.4$
γ 0.081 scin
0.108
0.189

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399 (1954).

Resonances Eu(n) E_n = 10 to 20 ev cryst s
10.6 ev 15.1
11.8 ~19.5
12.8

V.L.Sailor, H.H.Landon, H.L.Foote, Jr., Phys. Rev. 93, 1292 (1954).

Eu^{152}
63 89
13^y

Resonances Eu(n) E_n = 0.08 to 10 ev

	E_o (ev)	σ_o	Γ (ev)	
0.24*	(−0.011)			cryst s
0.19*	0.327	4000	0.086	
0.11*	0.461	23200	0.096	
0.08*	1.055	3100	0.11	
		$\sigma_o\Gamma^2$	$\sigma_o\Gamma$	
	2.73		40	
~0.06*	3.35	110		
~0.06*	7.36	130		

*Yield ratio 9.2^hEu/13^yEu

V.L.Sailor, H.H.Landon, H.L.Foote, Jr., Phys. Rev. 93, 1292 (1954); *R.E.Wood, Phys. Rev. 95, 453 (1954).

Eu^{154}
63 91
16^y

Resonances Eu(n) E_n = 0.08 to 10 ev

E_o (ev)	$\sigma_o\Gamma^2$	$\sigma_o\Gamma$	
1.76		50	cryst s
2.46	90		
3.84	70		
6.25		180	
8.98	100		

No yield of 9.2^hEu at these resonances*

V.L.Sailor, H.H.Landon, H.L.Foote, Jr., Phys. Rev. 93, 1292 (1954); *R.E.Wood, Phys. Rev. 95 453 (1954).

Dy

Dy$(\alpha,\alpha'\gamma)$ $E_\alpha = 3.4$
γ 0.076 scin
0.166

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399 (1954).

Dy^{165}
66 99
2.32^h

τ_2 2.38^h Dy(slow n)

E.R.Mayquez, Anales real soc. espan. fis. y quim. 50A, 95 (1954).

Ho^{160}
67 93
23^m

τ ~22^m Dy(8.5-Mev p) chem
Not produced by Er(22-Mev p), Ho^{165}(22-Mev p)
Not d $3.6^h$$Er^{161}$

T.H.Handley, Phys. Rev. 94, 945 (1954).

Ho^{161}
67 94
2.5^h

τ 2.5^h d 3.6^hEr chem
Er(24-Mev p), Dy(8.5-Mev p)
γ 0.090 scin
0.17
x K x ray

T.H.Handley, Phys. Rev. 94, 945(1954); 93, 524 (1954).

Ho^{162}	τ		5.0^h	Dy(8.5-Mev p)	chem
67 95	γ		0.19		scin
5.0^h			0.71		
			0.95		
	x		K x ray		

No 0.511 γ
Not produced by Ho^{165} (22.5-Mev p), Er(p)
No 65^d activity found

T.H.Handley, Phys. Rev. 94, 945 (1954).

Ho^{163}	τ		$< 10^m$ or $> 20^y$	d 75^mEr	chem
67 96				Dy(20-Mev p), Er(p)	chem
?					

No 5^d activity

T.H.Handley, Phys. Rev. 94, 945 (1954); 92, 1260 (1953).

Ho^{164}	τ		41^m	Dy(p), Ho(p), Er(p)	chem
67 97	β^-		0.9		a
41^m	x		K x ray ?		scin

T.H.Handley, Phys. Rev. 94, 945 (1954).

Ho^{165}			Ho^{165} $(\alpha,\alpha'\gamma)$	$E_\alpha = 3.4$	
67 98	γ		0.093		scin
stable			0.205		

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399 (1954).

Er			Er $(\alpha,\alpha'\gamma)$	$E_\alpha = 3.4$	
	γ		0.079		scin
			0.174		

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399 (1954).

Tm^{167}	τ		9.4^d	d 18.5^mYb	chem
69 98					
9.6^d					

T.H.Handley, E.L.Olson, Phys. Rev. 94,968 (1954).

Tm^{168}	τ		87^d	Tm^{169} (24-Mev p)	chem
69 99					
87^d					

T.H.Handley, E.L.Olson, Phys. Rev. 94, 968 (1954).

Tm^{170}	γ		(0.084)	$\alpha_K = 1.6$ x/γ	scin
69 101					
127^d					

Electromagnetic spectrum given for source thickness from 0 to 1.0 g/cm^2

K.Linden, N.Starfelt, Arkiv Fysik 7,109(1954).

Yb			Yb $(\alpha,\alpha'\gamma)$	$E_\alpha = 3.4$	
	γ		0.081		scin
			0.114		
			0.180		

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399; 93, 351 (1954).

Yb^{167}	τ		18.5^m	Tm^{169} (19.0-Mev p)	chem
70 97				p 9.6^dTm	scin
18.5^m	γ		0.118		scin
			0.18 ?		
			0.33 ?		
	x		K x ray		

No 73^m Yb or Tm activity

T.H.Handley, E.L.Olson, Phys. Rev. 94, 968 (1954).

Yb^{169}	τ		33^d	Tm^{169} (24-Mev p)	chem
70 99					
31.8^d					

T.H.Handley, E.L.Olson, Phys. Rev. 94, 968 (1954).

Lu			Lu $(\alpha,\alpha'\gamma)$	$E_\alpha = 3.4$	
	γ		0.113		scin
			0.183		
			0.248		

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399; 93, 906 (1954).

Lu^{176}	τ_2		4.56×10^{10y} *30*		
71 105	β^-		0.43		pc
2.4×10^{10}y	γ		(0.089)		pc
		100†	0.19	E2*	scin
		100†	0.31	E2 or E1*	

$(0.089\ \gamma)(0.19\ \gamma,\ 0.31\ \gamma)$ $(0.19\ \gamma)(0.31\ \gamma)$
$\epsilon/\beta^- = 0.03$ *From ce$^-$/β pc

D.Dixon, A.McNair, S.C.Curran, Phil. Mag. 45, 683 (1954).

	τ_2		2.35×10^{10y} *25**		
		0.6†	0.089		scin
		3.3†	0.203		
		3.7†	0.306		

$\epsilon/\beta^- < 0.1$ assuming x rays from conversion of E2 γ's

J.A.Arnold, Phys. Rev. 93, 743(1954); *priv. comm.

Hf			Hf $(\alpha,\alpha'\gamma)$	$E_\alpha = 3.4$	
	γ		0.093		scin
			0.112		
			0.250		

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399 (1954); 93, 906 (1954).

Ta^{181}	γ		Ta^{181} $(p,p'\gamma)$	$E_p = 2$ to 4	scin
73 108			0.137	I = 9/2	p,$\gamma(\theta)$
stable				E2/M1 < 0.05	
		17†	0.166		
		10†	0.303	I ≈ 11/2	p,$\gamma(\theta)$

$(0.137\gamma)(0.166\gamma)$

W.I.Goldburg, R.M.Williamson, Phys. Rev. 94, 747A (1954); 95, 629A, 767 (1954).

Ta^{181}
73 108
stable

Ta^{181}(α,$\alpha'\gamma$) $E_\alpha = 3.4$

γ	0.137	scin
	0.167	
	0.303	

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399; 93, 351 (1954).

Ta^{182}
73 109
111^d

β^- 0.510* Ta^{181}(pile n); sl

			α_K	α_{L1}	α_{L2}	α_{L3}	K/L
γ	w	0.03336					
	w	0.04271					
	9†	0.06571		2.8	0.4	0.23	
	100†	0.06774		0.17	0.07	0.07	
	6†	0.08467		1.85	0.6	0.5	
	46†	0.10009	1.5	0.13	1.4	1.35	
	9†	0.11366	1.75	0.38	0.07		
	2†	0.11640					
	43†	0.15241	0.07				
	14†	0.15637	small				
	19†	0.17936	0.41	0.17		0.05	
	9†	0.19831	0.24		0.11	0.07	
	45†	0.22205	0.06	0.01			
	24†	0.22927	0.16		0.05	0.03	
	27†	0.26409	0.11		0.04	0.02	
		0.927					
		0.960					
		1.003					7.0
	120†	1.122	0.005				6.7
	8†	1.155	0.004				
	56†	1.189	0.006				6.5
	115†	1.222	0.003				6.0
	58†	1.231	0.003				
		1.298					6.6
		1.375					
		1.437					
		1.454					

sl ce$^-$, cryst

*Evidence for at least two lower energy β's
Decay scheme proposed

F.Boehm, P.Marmier, J.W.M.DuMond, Phys. Rev. 95, 864 (1954).

Re^{187}
75 112
<10^{11y}

τ	$< 10^{11y}$	0.14 counts/min/cm^2	
β^-	< 0.008		a

A.D.Suttle, Jr., W.F.Libby, Phys. Rev. 95, 866 (1954).

Os^{189}
76 113
stable

I	3/2	OsO$_4$	I
μ	+0.65066		

$\nu(\mathrm{Os}^{189})/\nu(\mathrm{Cl}^{35}) = 0.79190\ 9$ TiCl$_4$

H.R.Loeliger, L.R.Sarles, Phys. Rev. 95, 291 (1954).

Ir

Ir(α,$\alpha'\gamma$) $E_\alpha = 3.4$

γ	0.133	scin
	0.219	
	0.360	

G.M.Temmer, N.P.Heydenburg, Phys. Rev. 94, 1399; 93, 906 (1954).

Ir^{192}
77 115
74.4^d

γ	0.9†	0.788	scin
	1.9†	0.883	
	w	0.92 ?	
	0.4†	1.080	
	0.07†	1.210	

E_{dis}(Ir–Pt) = 1.49 ± 0.02 4π scin

†Percent of the 0.605 γ + 0.613 γ peak

R.W.Pringle, W.Turchinetz, H.W.Taylor, Phys. Rev. 95, 115 (1954); 87, 930 (1952).

Pt^{191}
78 113
3.0^d

τ 2.90^d 5 Pt^{190}(pile n)

γ 0.0737 ? sπ ce$^-$

0.0826 $L_1L_2/L_3 = 1.8$

	K/L$_1$		K/L$_1$
0.0964	~2	0.360	~7
0.1296	~3	0.409	> 10
0.1723	~5	0.456	~9
0.1784		0.539	~7
0.2197		0.550	
0.2684		0.623	
0.3509	~9		

No 0.042 γ, 0.062 γ, 0.125 γ
(0.172 γ) (0.082 γ, 0.096 γ, 0.178 γ)
No (0.172 γ) ($\geq$ 0.350γ)

J.M.Cork, M.K.Brice, L.C.Schmid, G.D.Hickman, H.Nine, Phys. Rev. 94, 1218 (1954).

Pt^{193}
78 115
3.4^d

τ_1 3.4^d Pt^{192}(pile n)

γ IT 0.1355 K/L$_1$ = 0.25 sπ ce$^-$
$L_3/L_1 = 1.5$

~1.6 ? scin

J.M.Cork, M.K.Brice, L.C.Schmid, G.D.Hickman, H.Nine, Phys. Rev. 94, 1218 (1954).

Pt^{194}?
78 116
stable

Pt(p,p′γ) $E_p = 2.46$

γ	0.215
	0.330

C.L.McClelland, C.Goodman, Phys. Rev. 94, 1437A (1954).

Pt^{195}
78 117
~6^d

τ ~6^d Pt^{194}(pile n)

γ 0.0311 $L_1 : M = 32 : 5$ sπ ce$^-$
0.0991
$K : L_1 : L_3 : M = 23 : 13 : 1 : 5$
IT 0.1299*
$K : L_1 : L_3 = 10 : 50 : 85$

(0.031 γ) (0.099γ, x ray) (x ray) (x ray)

*Not crossover γ since not found in Au^{195} decay

J.M.Cork, M.K.Brice, L.C.Schmid, G.D.Hickman, H.Nine, Phys. Rev. 94, 1218 (1954).

Au^{195}
79 116
185^d

γ	0.099	scin
	0.145	

d 40^{h}Hg chem

C.H.Braden, L.O.Wyly, E.T.Patronis, Jr., Phys. Rev. 95, 758 (1954).

Au^{197} 79 118 stable

γ — $Au^{197}(p,p'\gamma)$ $E_p = 2$ to 4

0.195 scin

0.277 I = 5/2 $p,\gamma(\theta)$

E2/M1 ~ 0.07

0.545 I = 7/2 $p,\gamma(\theta)$

No 0.268 γ

No (0.545 γ)(0.195 γ, 0.277 γ)

W.I.Goldburg, R.M.Williamson, Phys. Rev. 94, 747A (1954); 95, 629A, 767 (1954).

Au^{198} 79 119 2.70^d

τ 2.699^d *3* Au^{197}(th n) ic

No Au^{199} present < 0.26%

Counted for 10 half-lives β electroscope

R.E.Bell, L.Yaffe, Can. J. Phys. 32, 416 (1954).

Capture γ $Au^{197}(n,\gamma)$ scin

0.248

γ energy range observed 0.1 to 2.0

M.Reier, M.H.Shamos, Phys. Rev. 95, 636A (1954).

Resonances Au^{197}(n) $E_n = 3$ to 200 ev

E_0 (ev)	σ_0	Γ	
4.94	31,000	0.16	chopper
	$\sigma_0\Gamma^2$		
62	500		
80	30		
110	12		
153	~70		
168	170		
194	~60		

F.G.P.Seidl, D.J.Hughes, H.Palevsky, J.S.Levin, W.Y.Kato, N.G.Sjöstrand, Phys. Rev. 95, 476 (1954).

Hg^{195} 80 115 40^h

τ 42^h Au^{197}(20-Mev p) chem

γ s 0.26 p 185^dAu scin

w 0.58

w 0.81

vw 1.17

No 0.511 γ

(K x ray)(0.26 γ, 0.58 γ, 0.81 γ)

No (0.26 γ)(0.58 γ)

C.H.Braden, L.O.Wyly, E.T.Patronis, Jr., Phys. Rev. 95, 627A, 758 (1954).

Hg^{197} 80 117 23^h

τ_1 24^h *1* Au^{197}(12-Mev p) chem

γ 0.133 scin

0.279*

0.58 ?

*0.279 γ follows a $29^h \pm 2$ half-life ?

C.H.Braden, L.O.Wyly, E.T.Patronis, Jr., Phys. Rev. 95, 627A, 758 (1954).

Hg^{198} 80 118 stable

Level $Hg(\gamma,\gamma')$ $E_\gamma = 0.411$

(0.411) $\tau = 3.3 \times 10^{-11}$s

Source heated to compensate for recoil

F.R.Metzger, W.B.Todd, Phys. Rev. 95, 853 (1954).

Hg^{203} 80 123 47^d

β^- 0.210 Hg(pile n) ms; sl

γ 0.279 $\alpha_K = 0.15$ E2,M1 slce$^-$

K/LM = 2.8

S.Thulin, K.Nybö, Arkiv Fysik 7, 289 (1954).

Tl^{198} 81 117 1.8^h

Au^{197}(36-Mev α) chem

γ 95* 0.0484 $\alpha > 10$ E2 $s\pi\sqrt{2}$ ce$^-$

$L_1:L_2:L_3:MN = <1.5:3.7:34:24$

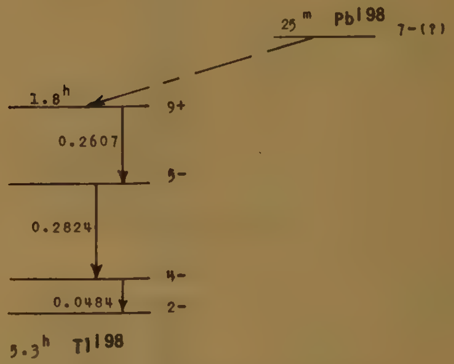
100* (0.2607) M4

$K:L_1:L_3:MN =$ 44 : 26 : 18 : 12

21* (0.2824) $K/L_1 = 9$

(K x ray)(0.282 γ)

*Relative intensity of ce$^-$



T.O.Passell, M.C.Michel, I.Bergström, Phys. Rev. 95, 999 (1954).

Tl^{203} 81 122 stable

Level $Tl(\gamma,\gamma')$ $E_\gamma = 0.280$

(0.280) $\tau \sim 1 \times 10^{-9}$s

Source heated to compensate for recoil

F.R.Metzger, W.B.Todd, Phys. Rev. 95, 627A (1954).

Tl^{204} 81 123 ~4^y

Tl(pile n)

β^- 0.77 $\Delta I = 2$ yes, shape sl

$\epsilon_K/\beta^- \sim 0.05$ from $e_A/\beta^- = 0.003$

T.Yuasa, J.Laberrigue-Frolow, L.Feuvrais, Compt. rend. 238, 1500 (1954).

Tl^{206} 81 125 4.19^m

Resonance Tl(pile n)4.19^mTl

~10 kev B absorption

H.W.Newson, R.H.Rohrer, Phys. Rev. 94, 654 (1954).

Tl^{208} 81 127 3.1^m

γ 0.5108 *3* d 10.6^hPb; sl ce$^-$

2.614 *2*

$H\rho$ (L) = 2606.9 ± 1.0

$H\rho$ (X) = 9985 ± 5.0

D.I.Meyer, F.M.Schmidt, Phys. Rev. 94, 927 (1954).

Pb^{203} Tl(14-Mev d) chem
82 121 γ 120† 0.280 K/LM = 2.5 scin
52^h 5† 0.403 $\alpha_K = 0.076$ K/LM = 3.7
E2 75%* $\gamma\gamma(\theta)$
1† 0.683
No 0.153 γ (< 3†)
(0.403 γ) (0.280 γ) (θ) I = 5/2, 3/2, 1/2
(x ray) (0.683 γ)
No ϵ to ground state (< 2%) (xx) (0.28γ)/(xγ)x
*Based on 75% E2 for 0.280 γ

J.Varma, Phys. Rev. 94, 1688, 795A (1954); J. Franklin Inst. 257, 247 (1954).

Pb^{204} g(3×10^{-7s} level) = + 0.04 ± 0.02 $\gamma\gamma(\theta, H)$
82 122
68^m

V.Krohn, S.Raboy, Phys. Rev. 95, 608A (1954).

Pb^{206} Level Pb(n,n'γ) E_n = 1.2 to 2.7
82 124 γ 0.81 scin
stable Graph of σ given

R.M.Kiehn, C.Goodman, Phys. Rev. 95, 989 (1954).

Pb^{212} γ 0.23863 6 sl ce^-
82 130 $H\rho$ (F) = 1388.56 ± 0.21
10.6^h $\Gamma(e^-_K$ 0.238 γ) ~ 50 ev
H determined (2-20 kev) with e^- accelerated through known potential

D.I.Meyer, F.H.Schmidt, Phys. Rev. 94, 927 (1954); 89, 908A (1953).

Bi^{207} Pb(27-Mev d) chem
83 124 γ 100† 0.565 $\alpha_K = 0.018$ E2 sl ce^-
$\sim 50^y$ K/LM = 3.0 scin
74† 1.060 $\alpha_K = 0.113$ M4
K/LM = 3.4
x ~80† K x ray
e_A : (ce^- 0.56 γ) : (ce^- 1.06 γ) = 14 : 23 : 100
p 0.82^sPb 80 ± 11%

A.H.Wapstra, Arkiv Fysik 7, 279 (1954).

Bi^{209} Levels Bi^{209}(n,n'γ) E_n = 0.8 to 2.7
83 126 γ 0.90 scin
stable 1.56
Graph of σ from threshold to 2.7

R.M.Kiehn, C.Goodman, Phys. Rev. 95, 989, 636A (1954).

Bi^{210} Resonances Bi^{209}(n) E_n = 0.2 to 13 kev
83 127
2.6×10^{6y}

E_0 (kev)	Γ(ev)	fast chopper
0.810	5.3	s wave
2.37	19	s wave
13*		

L.M.Bollinger, R.R.Palmer, D.A.Dahlberg, Phys. Rev. 95, 645A (1954); *verbal report.

Bi^{211} τ 2.15^m Pb^{208}(26-Mev α) chem
83 128
2.16^m

F.N.Spiess, Phys. Rev. 94, 1292 (1954).

Bi^{212} γ 0.03985* 5 d 10.6^hPb sl ce^-
83 129 *Assuming L_1 conversion
60.5^m $H\rho$ (A) = 534.11 ± 0.22

D.I.Meyer, F.H.Schmidt, Phys. Rev. 94, 927 (1954).

Bi^{214} γ (1.414) s ce^-
83 131
19.7^m
K : L_1 : L_2 : L_3 : M
530: 100: <20: <5: 25
L ratio limits consistent with theory for 0 to 0 decay

D.E.Alburger, A.Hedgran, Arkiv Fysik 7, 423 (1954).

Po^{209} γ ~75† 0.270 Bi^{209}(20-Mev p) scin
84 125 ~75† 0.570
$\sim 200^y$ ~75† 0.865
(0.270 γ) (0.570 γ)
γ's assigned to Po^{209} since no γ known in Po^{208}
†Photons per 10^4 α's

E.H.Daggett, G.R.Grove, Phys. Rev. 95, 627A (1954).

Po^{210}? In addition to g.s. α's (range 20 μ in ppl),
84 126 8500 tracks (not electrons) with ranges
138.4^d ≤ 300μ were observed from Po source

M.Ader, J. phys. radium 15, 60 (1954).

Po^{211} τ_1 0.52^s d 7.5^hAt chem
84 127 Pb^{208}(18-Mev α) chem
0.52^s α (7.43) ic
Long range α ? ~9

F.N.Spiess, Phys. Rev. 94, 1292 (1954).

Po^{211} τ_2 25^s Pb^{208}(18-Mev α) chem
84 127 α 7.14 ic
25^s Not d 7.5^hAt (< 0.01%)

F.N.Spiess, Phys. Rev. 94, 1292 (1954).

Po^{212}? In addition to g.s. and long range α's
84 128 (ranges 48-60 μ in ppl), observed several
$0.30^{\mu s}$ hundred tracks (not electrons) fanning out from ThB source with ranges ≤ 352 μ

M.Ader, J. phys. radium 15, 583 (1954); Compt. rend. 238, 1215 (1954).

At^{210} γ (0.0464) $\tau = 1.52\times10^{-9}$ scin
85 125 0.046 γ emitted from 1.58 level in Po^{210}*
8.3^h

A.W.Sunyar, Phys. Rev. 95, 626A (1954); *verbal report.

Fr^{223}
87 136
21^m

β^-		1.15	d 22^yAc chem;	scin
γ	40†	0.0498		scin
	24†	0.080		
	~3†	0.215		
	~0.8†	0.310		
x		L x rays		pc

No (0.0498γ)(0.080γ, 0.215 γ, L x ray)
No (0.215γ)(0.080γ)
No other γ (< 0.04†)
†Photons per 100 disintegrations

E.K.Hyde, Phys. Rev. 94, 1221 (1954).

Ra^{224}
88 136
3.64^d

(5.45 α) (0.241 γ)(θ) I = 0, 2, 0 scin

J.C.D.Milton, J.S.Fraser, Phys. Rev. 95, 628A (1954).

Ra^{226}
88 138
1620^y

(4.61 α) (0.186 γ) (θ) I = 0, 2, 0 scin

J.C.D.Milton, J.S.Fraser, Phys. Rev. 95, 628A (1954).

Th^{227}
90 137
18.6^d

γ	0.0498	d 22^yAc chem;	pc
	0.087		scin
	~0.14 ?		
	0.235		

(0.050 γ) (0.087 γ?, 0.14 γ?, 0.235 γ)
†Photons per 100 disintegrations

E.K.Hyde, Phys. Rev. 94, 1221 (1954).

Th^{233}
90 143
23.5^m

Resonances Th^{232}(n) E_n = 5 to 140 ev chopper

E_0 (ev)	$\sigma_0\Gamma$
22.1	7
23.8	13
61	10
71	120
117	7
127	20
133	10

F.G.P.Seidl, D.J.Hughes, H.Palevsky, J.S.Levin, W.Y.Kato, N.G.Sjöstrand, Phys. Rev. 95, 476 (1954).

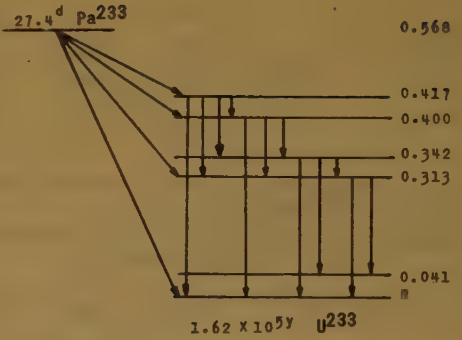
Pa^{233}
91 142
27.4^d

β^-	~50%	~0.14	Th^{232}(n,$\gamma$$\beta$) chem;	sl
	~45%	0.256		
	~ 5%	0.568		

γ		0.0172	v.w.	0.272 ?
	12†	0.0287	5†	0.301
	5†	0.0407	125†	0.313
	4†	0.058	10†	0.342
	22†	0.076		0.400
	17†	0.087		0.417
	12†	0.104		

0.474 γ too weak to observe if present
No 0.377 γ
†Relative intensity of ce⁻

Pa^{233}
91 142
27.4^d



W.D.Brodie, Proc. Phys. Soc. 67A, 397 (1954).

Pa^{234}
91 143
1.18^m

γ	0.7†	0.758	scin
	1.0†	0.998	
	0.03†	1.49	
	0.03†	1.7	
	0.1†	1.84	

No 0.80 γ (< 0.002†)
No (0.758 γ) (0.998 γ)
No γ with 0.3 < E_γ < 0.7 (< 0.1†)
†Photons per disintegration

W.G.Cross, T.A.Eastwood, Phys. Rev. 95, 628A (1954).

U^{234}
92 142
$2.52x10^{5y}$

(α) (ce⁻) delay < $1.4x10^{-9s}$ scin

D.Engelkemier, L.B.Magnusson, Phys. Rev. 94, 1395 (1954).

U^{239}
92 147
23.5^m

Resonance U(n) chopper
6.70 ev σ_0 = 23400*
Γ = 0.0256 ev*
Γ_γ = 0.024 ev*

J.S.Levin, D.J.Hughes, Phys. Rev. 95, 645A (1954); *verbal report.

Np^{237}
93 144
$2.2x10^{6y}$

α(< 0.1 ce⁻)delay = $3.69 x 10^{-8s}$ scin
Delay probably in level at 0.087

D.Engelkemier, L.B.Magnusson, Phys. Rev. 94, 1395 (1954).

Pu^{238}
94 144
90^y

(5.452 α) (0.044 γ) I = 0, 2, 0 scin

J.C.D.Milton, J.S.Fraser, Phys. Rev. 95, 628A (1954).

Pu^{239}
94 145
$2.4x10^{4y}$

I	1/2	para
$\lvert\mu\rvert$	0.5	

B.Bleany, P.M.Llewellyn, M.H.L.Pryce, G.R.Hall, Phil. Mag. 45, 773 (1954).

Am^{244}
95 149
26^m

τ	26^m	Am^{243}(pile n)	chem
β^-	1.5		scin
No prominent γ's			scin

A.Ghiorso, S.G.Thompson, G.R.Choppin, B.G.Harvey, Phys. Rev. 94, 1081 (1954).

Cm^{242}
96 146
162^d

τ 163^d 2 microcalorimeter
Counted over 12 month period

W.P.Hutchinson, A.G.White, Nature 173, 1238 (1954).

τ 162.5^d 3 ic
Counted over 7 month period

K.M.Glover, J.Milsted, Nature 173, 1238(1954).

Cm^{244}
96 148
19^y

τ 19.2^y Pu(pile n) chem ms
α activity compared to Cm^{242} ($\tau = 162.5^d$)

C.M.Stevens, M.H.Studier, P.R.Fields, J.F.Mech, P.A.Sellers, A.M.Friedman, H.Diamond, J.R.Huizenga, Phys. Rev. 94, 974 (1954).

Cm^{247}
96 151
$> 60^d$

τ $> 60^d$ Pn(pile n) chem ms
Cm^{244}/Cm^{247} constant over 20 day interval

C.M.Stevens, M.H.Studier, P.R.Fields, J.F.Mech, P.A.Sellers, A.M.Friedman, H.Diamond, J.R.Huizenga, Phys. Rev. 94, 974 (1954).

Bk^{249}
97 152
$\sim 1^y$

τ $\sim 1^y$ Pu(pile n) chem
α? $\sim 10^{-3}\%$ 5.4 ic
β^- 0.10
τ for spontaneous fission $> 10^{7y}$

H.Diamond, L.B.Magnusson, J.F.Mech, C.M.Stevens, A.M.Friedman, M.H.Studier, P.R.Fields, J.R.Huizenga, Phys. Rev. 94, 1083 (1954).

Bk^{250}
97 153
3.1^h

τ 3.13^h Bk^{249}(pile n) chem
β^- 0.9 p $\sim 12^y$Cf scin
1.9
γ ~ 0.9 scin
(0.9 β) ($\sim 0.9\gamma$)

A.Ghiorso, S.G.Thompson, G.R.Choppin, B.G.Harvey, Phys. Rev. 94, 1081 (1954).

Cf^{249}
98 151
$\sim 400^y$

τ $\sim 400^y$ d $\sim 1^y$ Bk chem
α 90% 5.82 ic
10% 6.0

A.Ghiorso, S.G.Thompson, G.R.Choppin, B.G.Harvey, Phys. Rev. 94, 1081; 93,908(1954).

τ $\sim 550^y$ Pu(pile n)chem ms
d $\sim 1^y$ Bk chem
α 5.81 ic
τ for spontaneous fission $> 10^{6y}$

H.Diamond, L.B.Magnusson, J.F.Mech, C.M.Stevens, A.M.Friedman, M.H.Studier, P.R.Fields, J.R.Huizenga, Phys. Rev. 94, 1083 (1954).

Cf^{250}
98 152
$\sim 9^y$

τ $\sim 9^y$ Pu(pile n) chem
α 6.03 ic
τ for spontaneous fission $> 10^{4y}$

H.Diamond, L.B.Magnusson, J.F.Mech, C.M.Stevens, A.M.Friedman, M.H.Studier, P.R.Fields, J.R.Huizenga, Phys. Rev. 94, 1083 (1954).

Cf^{250}
98 152
$\sim 9^y$

τ $\sim 12^y$ d 3.1^hBk chem
α 6.05 Pu(pile n)chem; ic
τ for spontaneous fission $\sim 5000^y$

A.Ghiorso, S.G.Thompson, G.R.Choppin, B.G.Harvey, Phys. Rev. 94, 1081 (1954).

Cf^{252}
98 154
2.1^y

τ $\sim 2^y$ Pu^{239}(pile n) chem
τ for spontaneous fission $\sim 100^y$

A.Ghiorso, S.G.Thompson, G.R.Choppin, B.G.Harvey, Phys. Rev. 94, 1081 (1954).

τ 2.1^y Pu(pile n) chem
α 6.12 ic
τ for spontaneous fission $\sim 60^y$

H.Diamond, L.B.Magnusson, J.F.Mech, C.M.Stevens, A.M.Friedman, M.H.Studier, P.R.Fields, J.R.Huizenga, Phys. Rev. 94, 1083 (1954).

Cf^{253}
98 155
18^d

τ 18^d Pu(pile n) chem

H.Diamond, L.B.Magnusson, J.F.Mech, C.M.Stevens, A.M.Friedman, M.H.Studier, P.R.Fields, J.R.Huizenga, Phys. Rev. 94, 1083 (1954).

τ $\sim 20^d$ Pu(pile n) chem
β^- p 19^d99 chem

G.R.Choppin, S.G.Thompson, A.Ghiorso, B.G.Harvey, Phys. Rev. 94, 1080 (1954).

$99^{254?}$
155
36^h

τ 36^h Pu(pile n) chem
β^- 1.1 p 3.2^h100 scin
No spontaneous fission in pure 99 samples

G.R.Choppin, S.G.Thompson, A.Ghiorso, B.G.Harvey, Phys. Rev. 94, 1080 (1954).

$99^{255?}$
156

τ $\sim 30^d$ Pu(pile n) chem
p $\sim 15^h$100

G.R.Choppin, S.G.Thompson, A.Ghiorso, B.G.Harvey, Phys. Rev. 94, 1080 (1954).

$100^{250?}$
150

τ $\sim 30^m$ U($\sim$180-Mev O^{16}) chem
α 7.7 ic

M.Atterling, W.Forsling, L.W.Holm, L.Melander, B.Åström, Phys. Rev. 95, 585 (1954).

$100^{255?}$
155
$\sim 15^h$

τ $\sim 15^h$ Pu(pile n) chem
α 7.1 d $\sim 30^d$ 99 ic

G.R.Choppin, S.G.Thompson, A.Ghiorso, B.G.Harvey, Phys. Rev. 94, 1080 (1954).

2. NEUTRON CROSS SECTIONS

Absorption cross sections for neutron energies marked "th" (thermal) have been determined, from measurements in a thermal neutron flux, in terms of the cross section value of a "standard" for neutrons of velocity 2200 m/sec. or energy ~ 0.025 ev. The standard used is stated just after the reference and is generally one known to have a thermal absorption cross section with a 1/v energy dependence. If the nucleus whose cross section is being measured also has a cross section with 1/v dependence, the cross section found for it by comparison with the standard will, of course, be a cross section for 2200 m/sec. If not, and the dependence often is not known, the value found by the comparison is $\overline{\sigma v}/2200$.

Target	Energy	σ	Value	Method	Ref.
H	14.1	el (θ)	graph	cc	54S48
	~90	el (θ)	graph	n scin	53S72
	~90	el (θ)	graph	n scin	54C43
	~300	el (θ)	graph	cc	54D21
	~400	el (θ)	graph	n scin	54H41
	0.0253 ev	a	0.323 8	mean life	54S66
	95-108	t	table		54C42
H^2	95-108	t	table		54C42
He	14.1	el (θ)	graph	cc	54S48
Li^6	1.1	$n,H^3(\theta)$	table	ppl	54W24
	1.5	$n,H^3(\theta)$	table	ppl	54W24
	2.0	$n,H^3(\theta)$	table	ppl	54W24
B	0.0253 ev	a	744 20	mean life	54S66
B^{10}	14.1	n, d_o*	0.021	pc	54R15
	14.1	n, d_1*	0.016	pc	54R15
*d_o to g.s. Be^9; d_1 to 2.43-Mev level Be^9					
C	62-108	t	table		54C42
C^{12}	14.1	n,n'+4.4 γ	0.3	γ scin	54T14
C^{13}	th	n,γ	0.9 2mb	$\sim 5600^{y}C$	54H44
N	14.1	el	0.82	cc	54S48
	14.1	el (θ)	graph	cc	54S48
	14.1	inel	0.48	cc	54S48
	14.1	inel (θ)	graph	cc	54S48
	14.1	2 prong	0.27	cc	54S48
	14.1	3 prong	0.016	cc	54S48
	3-13	t	graph		54N17
O	95-108	t	table		54C42
O^{16}	14.1	n,n'+6.1 γ	0.2	γ scin	54T14
	14.1	n,n'+~7 γ	0.05	γ scin	54T14
F^{19}	3-13	t	graph		54N17
Mg	3-13	t	graph		54N17

Target	Energy	σ	Value	Method	Ref.
Al^{27}	0.8-2.7	n,n'+0.85 γ	graph	γ scin	54K24
	1.0-2.7	n,n'+1.03 γ	graph	γ scin	54K24
	2.2-2.7	n,n'+2.23 γ	graph	γ scin	54K24
	95-108	t	table		54C42
Si	95-108	t	table		54C42
P^{31}	3-13	t	graph		54N17
S	2.2-4	$(n,\alpha)/(n,p)$	graph		54H37
Cl	3-13	t	graph		54N17
Cl^{35}	th	n,p	0.30	ppl	54B65
Cl^{37}	pile	n,γ	~0.005	$1.0^{s}Cl$	54S37
Ti	3-13	t	graph		54N17
Cr	1.4-2.7	n,n'+1.44 γ	graph	γ scin	54K24
Cr^{54}	pile	n,γ	0.36	$3.6^{m}Cr$	54B57
Mn^{55}	0.1-12 kev	t	graph		54S61
	3-13	t	graph		54N17
Fe	4.3	el	~2.6	ppl	54J6
	0.8-2.7	n,n'+0.85 γ	graph	γ scin	54K24
	4.3	n, 3.45 n'	~0.9	ppl	54J6
	4.3	n, 2.2 n'	~0.4	ppl	54J6
	4.3	n, 1.6 n'	~0.2	ppl	54J6
	95-108	t	table		54C42
Co^{59}	3-13	t	graph		54N17
Ni	1.3-2.7	n,n'+1.33 γ	graph	γ scin	54K24
	1.3-2.7	n,n'+1.47 γ	graph	γ scin	54K24
	3-13	t	graph		54N17
Zn	3-13	t	graph		54N17
Se	3-13	t	graph		54N17
Br	3-13	t	graph		54N17
Br^{79}	pile		~0.01	$5.1^{s}Br$?	54S37

Neutron Cross Sections continued

Target	Energy	σ	Value	Method	Ref.
Mo	3-13	t	graph		54N17
Ag	0.0253 ev	a	58 2	mean life	54S66
	2.5-800 ev	t	graph		54S61
	3-13	t	graph		54N17
Cd	3.7	el	2.5	n scin	54S31
	3.7	el (θ)	graph	n scin	54S31
	3.7	t	4.5		54S31
	3-13	t	graph		54N17
Sn	3.7	el	2.5	n scin	54S31
	3.7	el (θ)	graph	n scin	54S31
	3.7	t	4.6		54S31
	3-13	t	graph		54N17
Sb	3-13	t	graph		54N17
Te	3-13	t	graph		54N17
I^{127}	10-800 ev	t	graph		54S61
La	3-13	t	graph		54N17
Eu	0.08-58 ev	t	graph		54S11
Ta^{181}	3-13	t	graph		54N17
W	3-13	t	graph		54N17
Au^{197}	3-13	t	graph		54N17
Hg	3-13	t	graph		54N17
Tl	3-13	t	graph		54N17
Pb	1.2-2.7	$n,n'+0.81\ \gamma$	graph	γ scin	54S24
	62-108	t	table		54C42
Bi^{209}	3.7	el	6.9	n scin	54S31
	3.7	el (θ)	graph	γ scin	54S31
	0.8-2.7	$n,n'+0.90\ \gamma$	graph	γ scin	54K24
	0.8-2.7	$n,n'+1.56\ \gamma$	graph	γ scin	54K24
	3.7	t	8.3		54S31
U^{235}	0.0253 ev	a	691	chopper	54P13
Pu^{239}	th	$\sigma_f/\sigma_f(U)$	206 4		54L20
Am^{243}	pile	n,γ	$\sim$115	ms	54S33
	pile	n,γ	$\sim$140	26^{m}Am	54H40
Cm^{244}	pile	n,γ	$\sim$25	ms	54S33
Cm^{245}	pile	n,γ	$\sim$200	ms	54S33
Cm^{246}	pile	n,γ	$\sim$15	ms	54S33
Bk^{249}	pile	n,γ	$\sim$1100	3.1^{h}Bk	54H40

Neutron Cross Sections continued

Target	Energy	σ	Value	Method	Ref.
Cf^{249}	pile	n,γ	270	$\sim 9^{y}$Cf	54H40
	pile	a	$\sim$900	Cf^{249} loss	54H40
Cf^{252}	pile	n,γ	30	19^{d}99	54H40
Cf^{254}	pile	$n,\gamma\beta$	<2	$\sim 15^{h}$100	54H40
99^{253}	pile	n,γ	160	3.2^{h}100	54H40
99^{254}	pile	n,γ	<15	$\sim 15^{h}$100	54H40

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54C42 V.Culler, R.W.Waniek, Phys. Rev. 95,585,659A (1954).
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54H41 A.J.Hartzler, R.T.Siegel, W.Opitz, Phys. Rev. 95, 185, 591 (1954). Based on σ_t = 0.033.
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54P13 H.Palevsky, R.S.Carter, R.M.Eisberg, D.J.Hughes, Phys. Rev. 94, 1088 (1954).
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54S33 C.M.Stevens, M.H.Studier, P.R.Fields, J.F.Mech, P.A.Sellers, A.M.Friedman, H.Diamond, J.R. Huizenga, Phys. Rev. 94, 974 (1954).
54S37 G.Scharff-Goldhaber, M.McKeown, Phys. Rev. 95, 613A (1954); verbal report.
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3. GROUND STATE Q'S

For these data it seemed impractical to follow the policy adhered to in the main list of giving the A value of a target nucleus only when enriched material was used or when the target element is known to be monoisotopic. In the following reactions, the A values assigned by the experimenters to target and product nuclei are given as superscripts. In cases where enriched material was used, the superscript is underlined.

The standard used for the measurement of the energy of the incident or emitted light particle (whichever presented the greatest difficulty) is listed with the reference. In cases where the same standard was used for both measurements, special mention of this fact is made following the value assigned to the standard.

Reaction	Value		Source	Detector	Ref.
$H^{\underline{2}}(\gamma,n)H^{1}$	-2.227	3	EA	BF_3	54N16
$Li^{7}(p,n)Be^{7}$	-1.6462^{a}	10	VdG	BF_3	54J10
$Li^{7}(p,n)Be^{7}$	-1.6447^{b}	10	VdG	BF_3	54J10
$Be^{9}(\gamma,n)Be^{8}$	-1.662	3	EA	BF_3	54N16
$B^{\underline{10}}(p,n)C^{10}$	-4.35	20	Cyc	ppl	54A16
$B^{11}(d,p)B^{12}$	+1.100			s	54K23
$O^{\underline{18}}(p,\alpha)N^{15}$	+3.961	9	CcW	s	54M60
$Ne^{\underline{20}}(d,\alpha)F^{18}$	+2.791	9	CcW	s	54M61
$Ne^{\underline{20}}(d,p)Ne^{21}$	+4.526	9	CcW	s	54A21
$Ne^{\underline{22}}(d,p)Ne^{23}$	+2.968	8	CcW	s	54A20
$Mg^{\underline{25}}(p,\gamma)Al^{26}$	+6.35			scin	54K20
$Al^{\underline{27}}(d,p)Al^{28}$	+5.475			s	54K23
Did not resolve doublet					
$Si^{28}(d,\alpha)Al^{26}$	+1.416	8	VdG	s	54B60
$Si^{28}(p,n)P^{28}$	-14.9	6	Cyc	0.28^{s}P	54B55
$Si^{\underline{29}}(p,\gamma)P^{30}$	+5.55			scin	54E13
$S^{32}(p.n)Cl^{32}$	-14.1	6	Cyc	0.31^{s}Cl	54B55
$Ca^{\underline{42}}(d,p)Ca^{43}$	+5.70		VdG	s	54B45
$Ca^{\underline{44}}(d,p)Ca^{45}$	+5.19		VdG	s	54B45

54A16 F.Ajzenberg, W.Franzen, J.G.Likely, Phys. Rev. 95, 641A (1954); verbal report.

54A20 K.Ahnlund, Arkiv Fysik 7, 459 (1954); based on $Q[C^{12}(d,p)] = 2.722 \pm 0.005$.

54A21 K.Ahnlund, Arkiv Fysik 7, 155 (1954); based on $Q[Be^{9}(d,p)] = 4.587 \pm 0.006$.

54B45 C.M.Braams, Phys. Rev. 95, 650A (1954); based on $H\rho(Po\ \alpha) = 331,590$. This standard used for both incident and emitted particles.

54B55 S.W.Breckon, A.Henrikson, W.M.Martin, J.S. Foster, Can. J. Phys. 32, 223 (1954); based on $Q[Mg^{24}(p,n)] = -14.8 \pm 0.3$.

54B60 C.P.Browne, Phys. Rev. 95, 860 (1954); based on $H\rho(Po\ \alpha) = 331,590$. This standard used for both incident and emitted particles.

54E13 P.M.Endt, J.C.Kluyver, C.van der Leun, Phys. Rev. 95, 580 (1954).

54J10 K.W.Jones, R.A.Douglas, M.T:McEllistrem, H.T. Richards, Phys. Rev. 94, 947 (1954); [a] based on $E_{\gamma}(Au^{198}) = 411.770 \pm 0.036$ kev, [b] based on $E_{\gamma}(Co^{60}) = 1332.5 \pm 0.3$ kev. Measured $E_{thres}[Li^{7}(p,n)Be^{7}]/Q[Mg^{24}(p,p')] = 1.3734 \pm 0.0007$.

54K20 J.C.Kluyver, C.van der Leun, P.M.Endt, Phys. Rev. 94, 1795 (1954).

54K23 L.M.Khromchenko, Doklady Akad. Nauk SSSR 94, 1037 (1954).

54M60 C.Milelkowsky, Arkiv Fysik 7, 89 (1954); based on $Q[N^{15}(p,\alpha)] = 4.961 \pm 0.006$.

54M61 C.Milelkowsky, Arkiv Fysik 7, 117 (1954); based on $Q[O^{16}(d,p)] = 1.917 \pm 0.005$ presumably.

54N16 J.C.Noyes, J.E.Van Hoomissen, W.C.Miller, B.Waldman, Phys. Rev. 95, 396 (1954); absolute.

Report	Abstract	Availability
USNRDL-TR (Non-AEC)		
2	8-6385	Dep.
3	8-6386	Dep. (mc)
WADC-TR (Non-AEC)		
52-325 (Pt. 1)	8-6462	
53-1	8-6463	
53-41	8-6464	
53-113	8-6465	
54-1	8-6443	
54-83 (Pt. 1)	8-6466	
WADC-TR (Non-AEC)		
54-83 (Pt. 2)	8-6467	
54-83 (Pt. 3)	8-6468	
54-83 (Pt. 4)	8-6469	
54-83 (Pt. 5)	8-6470	
WAL (Non-AEC)		
401/15-34	8-6471	
401/93-34	8-6472	
843/13-10	8-6473	

PART II

Report	Abstract	Availability
AEC-tr		
1267	8-279	LC
1315	8-250	LC
1539	8-256	LC
1600	7-5774	LC
1606	8-4055	LC
1657	8-422	LC
1719	8-2398	JCL
1734	8-2766	JCL
1812	8-2399	JCL
1818	8-2333	LC
1917	8-4221	LC
AECD		
3254	5-6756	Revised in J. Research Natl. Bur. Standards 52, 223-6(1954)
AECU		
2661	7-5738	J. Clin. Invest. 33, 995-1000(1954)
2703	8-27	Cytologia 19, 77-85(1954)
2711	8-30	J. Am. Pharm. Assoc. Sci. Ed. 43, 65-9 (1954)
2851	8-3599	$0.20
AERE-C/R (British)		
808	6-2859	Proc. Roy. Soc. (London) A214, 207-25 (1952)
809	6-3541	Proc. Roy. Soc. (London) A214, 344-55 (1952)
851	6-4475	J. Chem. Soc., 1882-6(1952)
876	6-4762	J. Chem. Soc., 2705-7(1952)
898	6-5730	Trans. Faraday Soc. 49, 163-5(1952)
924	6-5986	Analyst 77, 685-96(1952)
930	6-5737	Analyst 77, 778-89(1952)
980	7-1379	Analyst 78, 394-405(1953)
990	7-1372	J. Chem. Soc., 757-64(1953)
995	7-552	J. Chem. Soc., 1172-5(1953)
1000	7-521	Analyst 78, 414-27(1953)
1023	7-1401	Trans. Faraday Soc. 49, 1122-31(1953)
1124	7-3547	Trans. Faraday Soc. 49, 1122-31(1953)
1154	7-4356	Trans. Faraday Soc. 50, 209-12(1954)
1232	8-5144	Analyst 79, 315-26(1954)
1278	8-5148	Analyst 79, 363-7(1954)
1354	8-4000	Analyst 79, 475-82(1954)
AERE-CE/R (British)		
903	7-4761	Combined with AERE-CE/R-904 and AERE-CE/R-905 in Trans. Inst. Chem. Engrs. 31, 78-93(1953)
904	7-4762	Combined with AERE-CE/R-903 and AERE-CE/R-905 in Trans. Inst. Chem. Engrs. 31, 78-93(1953)
905	7-4573	Combined with AERE-CE/R-903 and AERE-CE/R-904 in Trans. Inst. Chem. Engrs. 31, 78-93(1953)
913	6-5615	Fluid Handling, No. 26, 75(1952)
AERE-EL/R (British)		
952	6-6019	Vacuum 11, 152-4(1952)
1195	7-5502	J. Sci. Instr. 30, 409-12(1953)
AERE-HP/R (British)		
993	7-513	Nucleonics 11, No. 8, 22-5(1953)
AERE-M/R (British)		
829	6-3582	Trans. Brit. Ceram. Soc. 52, 204-12(1953)
843	6-2925	Proc. Phys. Soc. (London) B65, 512-25 (1952)
856	6-3613	Proc. Phys. Soc. (London) B66, 302-7 (1953)
1003	7-1523	Proc. Roy. Soc. (London) A217, 122-35 (1953)
1027	7-1547	J. Inst. Metals 82, 171-80(1953)
1031	7-1987	Acta Met. 1, 218-22(1953)
1034	7-3252	J. Polymer Sci., 513-20(1953)
1051	7-3253	J. Polymer Sci., 521-9(1953)
1054	7-2808	J. Mech. Phys. Solids 1, 182-8(1953)
1060	7-2918	Proc. Roy. Soc. (London) A218, 245-55 (1953)
1067	7-4080	Atomics 4, 189-94(1953)
AERE-M/R		
1104	7-3088	Acta Met. 1, 438-47(1953)
1176	7-4730	Proc. Phys. Soc. (London) B67, 201-10 (1954)
1184	7-4806	Research 6, 396-400(1953)
1197	8-2862	Acta Met. 2, 313-17(1954)
1208	8-4301	Inst. Metals 82, 456-62(1954)
1242	8-4574	Metallurgica 49, 210-17(1954)
AERE-Med/R (British)		
914	6-5021	Brit. J. Radiol. 25, 609-10(1952)
1101	7-3331	Brit. J. Radiol. 26, 352-7(1953)
AERE-T/R (British)		
875	6-4925	Proc. Roy. Soc. (London) A214, 515-30 (1952)
917	7-299	Proc. Roy. Soc. (London) A215, 278-89 (1952)
AERE-Trans (British)		
11/3/5/331	7-5681	LC
ANL		
5203	8-2160	J. Chem. Phys. 22, 1414-20(1954)
BM-RI (Non-AEC)		
5067	8-5565	U. S. Bur. Mines Rept. Invest. 5067, May 1954, 19p.
BNL		
1733	8-5076	Phys. Rev. 94, 1748-54(1954)
1834	8-5425	Phys. Rev. 95, 133-7(1954)
1904	8-5779	Nucleonics 12, No. 8, 16-17(1954)
1905	8-5918	Phys. Rev. 95, 1026-44(1954)
1909	8-5740	Phys. Rev. 95, 587-9(1954)
CRP (Canadian)		
247	4-284	Can. J. Research 27A, 191-206(1949)
ISC		
466	8-5173	J. Chem. Phys. 22, 1138(1954)
467	8-5174	J. Chem. Phys. 22, 1138-9(1954)
496	8-5124	J. Am. Chem. Soc. 76, 4046-7(1954)
KAPL		
1041	8-3223	$0.20
1092	8-4174	0.20
1131	8-4522	0.20

Report	Abstract	Availability
LRL		
86	8-3335	0.25
MLM		
799(Rev.)	8-5161	J. Phys. Chem. 58, 488-91(1954)
NBS (Non-AEC)		
3064	8-5150	J. Research Natl. Bur. Standards 52, 293-301(1954)
NP (AEC File No. for Non-AEC Reports)		
5207	8-4726	Phys. Rev. 95, 1209-11(1954)
NYO		
1585	7-534	Ind. Eng. Chem. 46, 1769-77(1954)
3478	6-6694	Phys. Rev. 95, 1226-35(1954)
3842	8-5035	Phys. Rev. 94, 1713-15(1954)
6378	8-2378	Chemistry and Industry, 307-8(1954)
6380	8-3710	Z. Naturforsch. 9b, 446-7(1954)
6565	8-5388	Phys. Rev. 95, 185-92(1954)
NYO		
6575	8-5426	Phys. Rev. 95, 288-9(1954)
ORNL		
1679	8-3453	$2.10
RAE-MET		
72	8-4593	Acta Met. 2, 451-5(1954)
UCRL		
1986	8-5102	Am. J. Roentgenol. Radium Therapy Nuclear Med. 72, 1-21(1954)
2538	8-5052	Phys. Rev. 94, 1797-8(1954)
2581	8-5339	Phys. Rev. 95, 293-5(1954)
2582	8-5738	Phys. Rev. 95, 578-9(1954)
2596	8-5311	Phys. Rev. 95, 863-4(1954)
2603	8-5489	Proc. Soc. Exptl. Biol. Med. 86, 369-71 (1954)
UR		
286	8-1344	Am. Ind. Hyg. Assoc. Quart. 15, 78(1954)